EPA CONTRACT NUMBER: 68-W-98-214
RAC II PROGRAM
TETRA TECH EC, INC.

FINAL WORK PLAN FOR REMEDIAL INVESTIGATION/FEASIBILITY STUDY OVERSIGHT CORNELL-DUBILIER ELECTRONICS SITE

EPA WORK ASSIGNMENT NUMBER: 154-RSBD-02GZ

MARCH 2006

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LIST OF ACRONYMS

ARAR	Applicable or Relevant and Appropriate Requirement
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLASS	Contract Laboratory Analytical Support Services
CLP	Contract Laboratory Program
CSM	Conceptual Site Model
Dana	Dana Corporation
DCE	Dichloroethene
DESA	Division of Environmental Science and Assessment
DQO	Data Quality Objective
EMSA	Environmental Measurements and Site Assessment
EPA	United States Environmental Protection Agency
EPC	Exposure Point Concentration
ESAT	Environmental Services Assistance Team
FASTAC	Field and Analytical Services Team Advisory Committee
FS	Feasibility Study
ft/ft	feet per foot
GIS	Geographic Information System
GRA	General Response Action
HASP	Health and Safety Plan
HHRA	Human Health Risk Assessment
HRS	Hazard Ranking System
IDW	Investigation-Derived Waste
LOE	Level-of-Effort
MESA	Memorandum on Exposure Scenarios and Assumptions
mg/kg	milligrams per kilogram
MNA	Monitored Natural Attenuation
mph	miles per hour
msl	mean sea level
NCP	National Contingency Plan
NJDEP	New Jersey Department of Environmental Protection
OU	Operable Unit
PAH	Polycyclic Aromatic Hydrocarbon
PAR	Pathway Analysis Report
PCB	Polychlorinated Biphenyl
PCE	Tetrachloroethene
pg/g	picogram per gram
pg/L	picogram per liter
PPE	Personal Protective Equipment
ppm	parts per million
PRP	Potentially Responsible Party
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control

RA	Risk Assessment
RI	Remedial Investigation
ROD	Record of Decision
ROW	Right-of-Way
RPD	Relative Percent Difference
RSCC	Regional Sample Control Center
SIP	Site Inspection Prioritization
SOP	Standard Operating Procedure
SOW	Statement of Work
SSL	Soil Screening Level
SVOC	Semi-Volatile Organic Compound
TCE	Trichloroethene
TOC	Total Organic Carbon
TtEC	Tetra Tech EC, Inc.
ug/m^3	micrograms per cubic meter
ug/L	micrograms per liter
ug/kg	microgram per kilogram
VOC	Volatile Organic Compound
WA	Work Assignment
WACR	Work Assignment Closeout Report
WAF	Work Assignment Form
WAM	Work Assignment Manager
WPA	Works Progress Administration

1.0 INTRODUCTION

Remedial Investigation (RI) and Feasibility Study (FS) activities for Operable Unit 3 (OU-3) will be undertaken at the Cornell-Dubilier Electronics Superfund Site (the Site) located in South Plainfield, New Jersey. The RI/FS for OU-3 will be conducted by de maximis, inc., acting as a Contractor for the Potentially Responsible Party (PRP), Dana Corporation (Dana).

Tetra Tech EC, Inc. (TtEC) will provide technical oversight and enforcement support to the United States Environmental Protection Agency (EPA) during the PRP's RI/FS activities for OU-3. This Draft RI/FS Oversight Work Plan has been prepared by TtEC in response to Work Assignment (WA) 154-RSBD-02GZ and in accordance with the Statement of Work (SOW) included as Attachment 1 to the Work Assignment Form (WAF), dated 10 August 2005 and, as amended by, WAF Amendment 1 (dated 12 December 2005). This WA was issued by EPA under EPA RAC II Contract Number 68-W-98-214.

The RI/FS for the Site is comprised of four operable units: residential, commercial, and municipal properties in the vicinity of the former Cornell-Dubilier Electronics facility (OU-1); the facility soils and buildings (OU-2); groundwater and vapor intrusion (OU-3); and the Bound Brook (OU-4). Remedial activities to date for the OUs include:

- The results of the residential, commercial, and municipal properties investigation (OU-1) were addressed in the OU-1 Remedial Investigation Report and OU-1 Feasibility Study Report (FWENC, 2001b; 2001c). The Record of Decision (ROD) for OU-1 was issued in September 2003.

- The results of the facility soils and buildings investigation (OU-2) were addressed in the OU-2 Remedial Investigation Report and OU-2 Feasibility Study Report (FWENC, 2002; 2004). The ROD for OU-2 was issued in September 2004.

- An Administrative Order on Consent (Consent Order) was entered into between EPA and Dana on 1 August 2005, which requires the PRP to perform the RI/FS activities for OU-3.

- A separate EPA WA has been issued for TtEC to conduct the RI/FS for OU-4.

This Work Plan describes the activities that TtEC will conduct, to assist EPA in overseeing the PRP's RI/FS activities for OU-3. Preparation of this Work Plan was accomplished utilizing: the SOW provided in the initial WAF; WAF Amendment 1 dated 12 December 2005; the Consent Order; other background documents; and items discussed during the 6 December 2005 scoping meeting, and the technical meeting which followed the scoping meeting.

1.1 Purpose

The purpose of this WA is to provide technical oversight and enforcement support services to the EPA for the RI/FS activities to be conducted for OU-3 of the Cornell-Dubilier site. TtEC will accomplish this objective by: reviewing the PRP's documents, overseeing field activities, collecting and analyzing split samples, providing bi-weekly field reports, and evaluating data results in a Data Evaluation Summary Report.

1.2 Background

1.2.1 Site Location

The Site consists of the Hamilton Industrial Park, contaminated portions of the Bound Brook adjacent to and downstream of the industrial park, and contaminated residential, municipal, and commercial properties in the vicinity of the former Cornell-Dubilier Electronics Corporation, Inc. (Cornell-Dubilier Electronics) facility. The former Cornell-Dubilier Electronics facility, also presently known as the Hamilton Industrial Park, is located at 333 Hamilton Boulevard in South Plainfield, Middlesex County, New Jersey. The facility consists of approximately 26 acres, containing numerous subdivided buildings that are used by several commercial and industrial operations (Figures 1-1 and 1-2). The former Cornell-Dubilier Electronics facility portion of the Site is bordered on the northeast by Bound Brook and the former Lehigh Valley Railroad, Perth Amboy Branch (presently Conrail); to the southeast by the South Plainfield Department of Public Works property, which includes an unnamed tributary to Bound Brook; to the southwest, across Spicer Avenue, by single-family residential properties; and to the northwest, across Hamilton Boulevard, by mixed residential and commercial properties (Figure 1-2).

1.2.2 Site Development History

The Spicer Manufacturing Company established operations at the facility in 1912 (South Plainfield Bicentennial Committee, 1976). Most of the major structures on-site were erected by 1918. Table 1-1 presents construction dates and Cornell-Dubilier Electronic's usage of the structures on the property, as shown on a Factory Insurance Association Map (FIA, 1956). The Spicer Manufacturing Company ceased its operations at the facility in the mid to late 1920s. When the Spicer Manufacturing Company ceased operations at the facility, the property consisted of approximately 210,000 square feet of buildings.

According to personnel at the South Plainfield building department, Hamilton Boulevard, located west of the facility property, was initially a concrete roadway, first paved in the 1930s as a Works Progress Administration (WPA) project. This road was paved with asphalt in the 1960s or 1970s.

1.2.3 Site Manufacturing History

The Spicer Manufacturing Company operated a manufacturing plant on the property from 1912 through the mid- to late 1920s. The plant manufactured universal joints and drive shafts, clutches, drop forgings, sheet metal stampings, screw products, and coil springs for the automobile industry. The plant included a machine shop, a box shop, a lumber shop, a scrap shop, a heat treating building, a transformer platform, a forge shop, a shear shed, a boiler room, an acid pickle building, and a die sinking shop. A chemical laboratory for the analysis of steel was added in 1917. The Spicer Manufacturing Company is Dana Corporation's predecessor (EPA, 2001a).

Cornell-Dubilier Electronics operated at what is now the Hamilton Industrial Park from 1936 to 1962, manufacturing electronic components including capacitors. It has been reported that the company also tested transformer oils for an unknown period of time. Polychlorinated biphenyls (PCBs) and chlorinated organic degreasing solvents were used in the manufacturing process, and it has been alleged that during Cornell-Dubilier Electronics' period of operation, the company disposed of PCB-contaminated materials and other hazardous substances at the facility. A former employee has claimed that the rear of the property was saturated with transformer oils and that capacitors were also buried behind the facility during the same time period (EPA, 1996a).

PCBs are a group of chemical compounds consisting of mixtures of numerous chlorinated biphenyl molecules. The compounds differ both in the number and/or position of chlorine atoms attached to the biphenyl rings and in the degree of chlorination, for a total of 209 possible individual compounds (i.e., congeners). For commercial purposes, common mixtures of PCBs were given names/identification numbers, indicating the degree of chlorination, type of formulation, or other properties. For example, one series of mixtures was named "Aroclor," and the specific mixture was then further distinguished by the percentage of chlorine (e.g., Aroclor-1248 contained 48 percent chlorine).

The PCB-containing capacitors were manufactured by winding together thin sheets of aluminum foil and paper (Foley, Hoag & Eliot, 1988; 1996). This bundle was then wrapped in insulation and placed inside a canister. The canister unit was sealed, except for small fill holes through which dielectric material was introduced. The capacitors underwent initial testing, and if working properly, were subsequently placed in an impregnation tank. Here the capacitors were evacuated and filled with Aroclor-1254, with some capacitors also being impregnated with vegetable oil, mineral oil, or boric acid.

The fill holes were sealed, and the entire unit was then placed in a degreasing unit. The degreasing agent utilized was trichloroethene (TCE). Excess Aroclor was drained through a closed filtration system linked to the impregnation tanks, and the filter medium used was diatomaceous material ("fuller's earth").

The capacitors which failed specifications were drained of Aroclor-1254, and if the canister and/or capacitor parts could not be reused, these materials may have been disposed on the site (Foley, Hoag & Eliot; 1988; 1996). The diatomaceous material used in the filtering process and any residue that had accumulated on the interior of the degreasing units may also have been disposed on the facility property. Small accidental leaks or spills of Aroclor occurred occasionally in the factory; these spills likely were dealt with through gutters along the edges of work benches to contain the spills or cleaned by spreading an absorbent substance, such as fuller's earth, on the spill.

Following Cornell-Dubilier Electronic's departure from the property, the facility was operated as a rental property consisting of warehouses and light industries. Since the early 1960s, numerous tenants have occupied the complex, also known as the Hamilton Industrial Park.

1.2.4 Previous Investigations

The following is a chronological summary of the sampling and analytical programs conducted on or in the vicinity of the site to date. The current understanding of site-related contaminants is presented in Section 2.0.

- 4 January 1985 – New Jersey Department of Environmental Protection (NJDEP) personnel visited the facility property and noted in the *Preliminary Assessment Report* (11 August 1986) that a portion of the lot located in the back of the facility contained a black soil unnatural to the area (EPA, 1995). In addition, NJDEP personnel noted that four large black tanks were present on the edge of a large filled-in area near the rear of the property. The tanks were at the top of an embankment leading down to Bound Brook.

- 11 September 1986 – NJDEP conducted a Site Inspection and collected three surface soil, two surface water, and two sediment samples at the facility property. Exact sample locations are not available. Several metals, volatile organic compounds (VOCs), and Aroclor-1254 were detected in the soil and sediment samples. Information on the investigation event is presented in the *Site Inspection Report*, dated 12 September 1986, and the *Data Validation Review Memorandum*, dated 13 April 1987 (EPA, 1995).

- January 1987 through October 1990 – NJDEP sampled wells in the vicinity of the site for VOCs, and the sampling results are provided in a report titled *Pitt Street Private Wells, South Plainfield Borough, Middlesex County, Interim Ground-Water Impact Area* (September 1990, revised February 1991). Elevated levels of chlorinated solvents, such as TCE up to 6,850 micrograms per liter (ug/L) and tetrachloroethene (PCE) up to 3,800 ug/L, were detected. Due to widespread contamination, residential wells in the area were reportedly closed, and NJDEP has denoted this area (which does not include the site) as an "Interim Ground-Water Impact Area" (Figure 1-1).

- March to July 1990 – NJDEP investigated an oil and water mixture that was leaching into a pit in the basement of Building No. 15. D.S.C. of Newark Enterprises, Inc., the owner of the property, dug 14 test holes in the vicinity of the building, between the building and a 125,000-gallon aboveground oil tank, and in the vicinity of two former 8,000 gallon and one former 11,000-gallon aboveground oil tanks (DSC, 1990a; 1990b). Oil was present on the water in seven locations, of which five were along the piping from the present oil tank to the building, one was in the former tank area, and one was between the former tank area and the present tank piping. The two test holes dug closest to the 125,000-gallon tank did not indicate floating oil.

- 30 March 1994 – Five tanks were observed in the northeast embankment area during an EPA Site Inspection Prioritization (SIP) reconnaissance visit (EPA, 1995). However, the "black soil" previously reported by NJDEP was not visible during this inspection. Two small soil piles, covered with plastic, were observed in front of Building No. 14. The boiler system leaked heating oil onto the soil in the vicinity of Building No. 18, and the piles contained the excavated soil.

- 8 June 1994 – EPA collected six surface soil, four sediment, and four surface water samples from the facility property during a SIP sampling event. Results of the sampling are summarized in the *Site Inspection Prioritization Evaluation Report*, dated 23 January 1995 (EPA, 1995). VOCs, semi-volatile organic compounds (SVOCs), Aroclor-1254, and various metals were detected in soils at concentrations significantly exceeding background levels. Aroclor-1254, TCE, 1,2-dichloroethene (1,2-DCE), and lead were detected in a sediment sample from Bound Brook near the rear of the property. In addition, elevated concentrations of polycyclic aromatic hydrocarbons (PAHs, a class of SVOCs), Aroclor-1254, lead and zinc were present in the sediment collected near the outfall pipe. Aroclor-1254, Aroclor-1248, 1,2-DCE, and various metals were also detected at elevated concentrations in surface water samples from Bound Brook.

- 13 October 1994 – EPA collected two additional sediment samples from Bound Brook to obtain appropriate background concentrations to compare to the SIP sampling event results (EPA, 1995). These background samples contained total PCB concentrations of 0.7 milligrams per kilogram (mg/kg) and 0.35 mg/kg.

- 29 February 1996 – EPA collected four additional surface soil samples (and a duplicate sample) and four additional sediment samples from the facility property and Bound Brook, respectively. Aroclor-1254 was detected at concentrations up to 77 mg/kg in the soils and up to 520 mg/kg in the sediments, as described in the *Hazard Ranking System Documentation Report*, dated December 1996 (EPA, 1996a). During this Hazard Ranking System (HRS) sampling event, it was noted that the tanks were no longer present on the edge of the northeast embankment.

- 23 April 1996 – EPA collected four air samples, one from each of the four perimeter sides of the truck driving school area (in the center of the open portion of the property). During the sampling, visible dust was noted with the winds out of the west to northwest at approximately 10 to 20 miles per hour (mph). The samples were analyzed for PCBs, lead, cadmium, silver, and arsenic. No PCBs were present at a detection limit of 3.3 micrograms per cubic meter (ug/m^3). Lead was detected in two of the air samples, at concentrations of 3.5 ug/m^3 and 7.2 ug/m^3, with the higher concentration present in the background upwind sample location.

- 11 June 1996 – EPA completed a Screening Level Ecological Risk Assessment (EPA, 1996b), which included a comparison of surface water and sediment contaminant levels to available screening values. The risk assessment indicated that contamination of stream sediments adjacent to, and apparently associated with, the site was present at levels that have been linked to adverse impacts in benthic organisms in other freshwater systems.

- 27 and 29 June 1996 – EPA collected surface and subsurface soil samples from the facility roadway, the vacant open field area, a foot/bicycle path that crossed the property, and the southeastern and eastern floodplain areas. Two depth intervals were sampled, 0 to 3 inches and 3 to 12 inches below ground surface (bgs) (3 to 18 inches bgs for the roadway only). Aroclor-1254 was detected in on-site surface soils at concentrations as high as 51,000 mg/kg from the field area and at 100 mg/kg in a sample from the floodplain of Bound Brook. Concentrations of Aroclor-1254 ranged up to 5,000 mg/kg in the surface soils along the foot/bicycle path. Lead concentrations ranging from 1,740 mg/kg to 66,600 mg/kg were measured in surface soil samples collected near the foot/bicycle path and the northeast corner of the fenced area, within the area where exposed waste materials were located. Aroclor-1254 was present in the soils at the surface and beneath the gravel/stone layer of the roadway, up to 340 mg/kg and 22,000 mg/kg, respectively. Lead was detected on the surface of the facility roadway at concentrations as high as 340 mg/kg, and beneath the gravel/stone layer at concentrations as high as 7,460 mg/kg. In addition, EPA collected one sediment sample for total organic carbon (TOC, at 840 mg/kg) and grain size analyses.

- 16 July 1996 – Six test pits were excavated in the vacant open field area, and 18 soil samples were collected. The test pits revealed stained subsurface soils, drum carcasses, electrical parts, paper-thin mica-like chips, wood, and debris. Aroclor-1254 and lead were detected at concentrations as high as 1,900 mg/kg and 1,970 mg/kg, respectively. Water was present in Test Pit No. 1 at a depth of 4.5 feet bgs; the remainder of the test pits revealed some groundwater infiltration between 7 and 9 feet bgs.

- 21 March 1997 – EPA conducted wipe sampling in 12 buildings located at the former Cornell-Dubilier Electronics facility. Aroclor-1254, Aroclor-1260, lead, and cadmium contamination were identified on building surfaces. The results for the 27 samples are presented in the *Final Report, Wipe Sampling*, dated May 1997 (Weston, 1997g).

- 5 and 9 June 1997 – EPA conducted chip, air, and vacuum dust sampling of two building interiors at the facility, with additional air samples also being collected at "trucking fenceline" and "roadway corner, trucking facility." Concentrations of Aroclor-1248 and Aroclor-1254 as high as 31,000 mg/kg and 57,000 mg/kg, respectively, were measured in the chip samples. The dust and chip samples also indicated lead (maximum concentration of 3,800 mg/kg) and cadmium (maximum concentration of 130 mg/kg). Detected concentrations in the air samples ranged up to 33 ug/m^3 for PCBs, 0.971 ug/m^3 for lead and 0.054 ug/m^3 for cadmium. The *Trip Report* (23 June 1997) and *Analytical Report* (August 1997) summarize the results of the building investigation (Weston, 1997e; 1997c).

- 16 through 20 and 27 June 1997 – EPA initiated a study to determine the impacts of contamination of Bound Brook to human health and the environment. Soil, sediment, water, and biota (fish, crayfish, and small mammals) samples were collected along Bound Brook adjacent to and downgradient of the Site. Samples of edible fish were collected from Bound Brook, New Market Pond, and Spring Lake for use in assessing human health risks. Results of the sampling are presented in the *Bound Brook Sampling and Edible Fish Tissue Data Report*, dated August 1997 (EPA, 1997b).

- 26 and 27 June 1997 – EPA collected 20 surface soil samples and a field duplicate sample from residential properties in the vicinity of the facility, and the investigation is summarized in a *Sampling Trip Report*, dated 7 July 1997, and two data package transmittals, dated 4 August 1997 (Weston, 1997d; 1997a; 1997b). The soil samples were analyzed for PCBs, lead, and cadmium. Detected concentrations ranged up to 4.8 mg/kg for Aroclor-1254, up to 291 mg/kg for lead, and up to 2.3 mg/kg for cadmium.

- 7 August 1997 – EPA collected additional soil, sediment, surface water, and biota samples along the Bound Brook adjacent to and downstream of the industrial park. Aroclor-1254 concentrations as high as 13 mg/kg (wet weight) and 6.2 mg/kg (wet weight) were measured in the sediment and floodplain soils, respectively. Copper, zinc, lead, and barium were detected in the soils and sediments, at concentrations up to 210 mg/kg, 620 mg/kg, 540 mg/kg, and 380 mg/kg (dry weight), respectively. The fish fillet samples contained detections of two PCBs and seven pesticides. Data collected during this sampling event, in conjunction with the June 1997 concentrations, were utilized to conduct an ecological risk assessment, and the results are presented in the *Final Report, Ecological Evaluation for the Cornell Dubilier Electronics Site* (EPA, 1999a).

- August 1997 through November 1997 – EPA conducted sampling along the Bound Brook floodplain, collecting surface and subsurface soils from the banks and sediments from the streambed. As described in the *Soil and Sediment Sampling and Analysis Summary Report* (8 September 1998), one hundred transects were established along approximately 2.4 miles of the brook, with transects located upstream, midstream, and downstream of the site (Weston, 1998b). Four of the transects were located downstream of the New Market Pond spillway. Mean total PCB concentrations were 7.59 mg/kg for the surface soils; 11.97 mg/kg for the subsurface soils; 2.93 mg/kg for the surface sediments; and 2.34 mg/kg for the subsurface sediments.

- 27 through 30 October 1997 – EPA collected surface soil samples (0 to 2 inches in depth) from the following residential properties which were chosen based on location and potential wind direction: 130 Spicer Avenue, 501 Garibaldi Avenue, 500 Garibaldi Avenue, 320 Spicer Avenue, 204 Spicer Avenue, 210 Spicer Avenue, 214 Spicer Avenue, 336 Spicer Avenue, 305 Spicer Avenue, 507 Hamilton Boulevard, 311 Delmore Avenue, 228 Spicer Avenue, 233 Delmore Avenue, 501 Hamilton Boulevard, 108 Spicer Avenue, and 345 Metuchen Road. Aroclor-1254 and Aroclor-1260 concentrations as high as 22 mg/kg and 2.2 mg/kg, respectively, were measured in these "Tier I" soil samples. The results are summarized in the *Tier I Residential Sampling and Analysis Summary Report*, dated 25 June 1998 (Weston, 1998f).

- 17 and 18 November 1997 – EPA collected interior dust samples from residential properties, and the results are provided in the *Final Report, Vacuum Dust Sampling*, dated February 1998 (Weston, 1998g). Sampled properties included residences on Hamilton Boulevard (one), Spicer Avenue (eight), Garibaldi Avenue (two), and Delmore Avenue (one). Aroclor-1254 and Aroclor-1260 concentrations as high as 120 mg/kg and 85 mg/kg, respectively, were measured in the dust samples.

- 20 through 23 April 1998 – Based on the PCB concentrations detected in the "Tier I" sampling event, EPA conducted "Tier II" soil sampling at additional properties, progressively moving away from the former facility. These residential properties were: 127 Delmore Avenue, 135 Delmore Avenue, 201 Delmore Avenue, 221 Delmore Avenue, 207 Delmore Avenue, 403 Hamilton Boulevard, 237 Delmore Avenue, 115 Delmore Avenue, 131 Delmore Avenue, 215 Delmore Avenue, 346 Hamilton Boulevard, 511 Hamilton Boulevard, 119 Delmore Avenue, 229 Delmore Avenue, and 123 Delmore Avenue. Maximum PCB concentrations were 60 mg/kg for Aroclor-1254 and 4.6 mg/kg for Aroclor-1260. Results of the investigation are presented in the *Tier II Residential Sampling and Analysis Summary Report*, dated 2 July 1998 (Weston, 1998d).

- 21 through 28 April 1998 – EPA conducted vacuum sampling in residential properties on Hamilton Boulevard (twelve), Delmore Avenue (fifteen), Forest Haven Boulevard (one), Garibaldi Avenue (two), and Spicer Avenue (six). These dust samples contained Aroclor-1242, Aroclor-1254, and Aroclor-1260, and detected PCB concentrations ranged from 0.11 to 27 mg/kg. The *Final Report, Vacuum Dust Sampling* (July 1998) summarizes the results of this investigation (Weston, 1998e).

- 4 and 5 May 1998 – As results of the previous "Tier I" and "Tier II" sampling events indicated PCB concentrations greater than EPA's screening level (1 mg/kg), EPA conducted "Tier III" soil sampling at four residential property areas in the vicinity of the facility property. The results are summarized in the *Tier III Residential/Neighborhood Sampling and Analysis Summary Report*, dated 10 July 1998 (Weston, 1998c). Sampling was typically conducted at approximately 100-foot intervals along the area roadways.

  Area 1 was defined as the block of land bounded by Delmore Avenue, Belmont Avenue, Arlington Avenue, and Hamilton Boulevard. Thirty-nine surface soil samples were collected for PCB analysis from the following residential roadways: Hamilton Boulevard, Arlington Avenue, Delmore Avenue, Garibaldi Avenue, and Fulton Street. Aroclor-1254 concentrations ranged from 0.027 to 2.9 mg/kg. Aroclor-1260 concentrations ranged from undetected to 0.64 mg/kg.

  Fifteen surface soil samples were collected within Area 2, defined as the northeast side of Delmore Avenue, between Fulton Street and Belmont Avenue. Soil samples were collected for PCB analysis from Belmont Avenue and Delmore Avenue. Concentrations of Aroclor-1254 ranged from 0.022 to 1.5 mg/kg, and Aroclor-1260 concentrations ranged from undetected to 0.75 mg/kg.

  Area 3 was defined as the south side of Belmont Avenue, between Arlington Avenue and Metuchen Road. Ten surface soil samples were collected for PCB analysis from the following roadways: Arlington Avenue, Delmore Avenue, and Belmont Avenue. Concentrations of Aroclor-1254 ranged from 0.085 to 0.93 mg/kg. Aroclor-1260 concentrations ranged from undetected to 0.14 mg/kg.

  Ten surface soil samples were collected for PCB analysis from residential properties in Area 4, defined as the southeast side of Hancock Street, between Lakeview and Amboy Avenues. Aroclor- 1254 concentrations ranged from 0.037 to 1.2 mg/kg, and Aroclor-1260 concentrations ranged from 0.017 to 0.2 mg/kg.

- 26 through 28 October 1998 – EPA collected indoor wipe samples at 13 businesses located in the vicinity of the former Cornell-Dubilier Electronics facility, along Hamilton Boulevard and Spicer Avenue. No PCBs were detected in these wipe samples.

In addition, EPA collected one to two surface soil samples from five of these commercial properties, where soil was available for sampling. The five properties included 417 Hamilton Boulevard, 321 Spicer Avenue, 405 Spicer Avenue, 408 Hamilton Boulevard, and 340 Hamilton Boulevard. Aroclor-1254 was detected at concentrations between 0.12 and 7.1 mg/kg.

Five residential properties in the vicinity of the facility property, along Delmore Avenue, Spicer Avenue, and Hamilton Boulevard, were vacuum sampled by EPA. Weathered Aroclor-1254 was present at concentrations as high as 39 mg/kg.

The results of the October 1998 sampling are presented in the *Final Report, Vacuum, Wipe and Soil Sampling*, dated December 1998 (Weston, 1998a).

- 14 November 1998 – EPA collected 31 surface soil samples and 2 duplicate samples from Property FF located on Spicer Avenue (referred to as "Addendum to Tier I") and presented in a 16 February 1999 report, *Tier I Residential Sampling and Analysis Summary Report, Addendum No. 1* (Weston, 1999b).

- 21 November 1998 – EPA resampled soils at the following Bound Brook transect locations: CCSD1 (Transect CC), DDSS1 (Transect DD), HHSD1 (Transect HH), PPPND2 (Transect PPP), and UUUSD1 (Transect UUU). One surface soil sample and four subsurface soil samples were collected and analyzed for PCBs, as described in the *Soil and Sediment Sampling and Analysis Summary Report, Addendum No. 1*, dated 3 March 1999 (Weston, 1999a). Results indicated Aroclor-1254 at detected concentrations ranging from 1.2 mg/kg to 580 mg/kg. These results revised the mean total PCB concentrations for surface (from 7.59 to 6.88 mg/kg) and subsurface (from 11.97 to 12.28 mg/kg) soils.

- 20 and 21 April 1999 – The Environmental Measurements and Site Assessment (EMSA) section of NJDEP conducted surface (0 to 6 inches) and shallow subsurface (18 to 24 inches) sediment sampling in Spring Lake and along Cedar Brook from Plainfield High School to the lake (NJDEP, 1999). Sediment samples were also collected along a feeder stream from Maple Avenue to Cedar Brook. No PCBs were detected in any of the samples collected. Alpha- and gamma-chlordane were the most prevalent contaminants detected, with concentrations as high as 0.17 mg/kg and 0.13 mg/kg, respectively. DDT and DDD were also listed as primary contaminants, with concentrations as high as 0.69 mg/kg and 0.091 mg/kg, respectively.

- 21 through 23 June 1999 – Additional samples from the Bound Brook floodplain, downstream of Spring Lake, were collected by EPA and analyzed for PCBs. Four areas were sampled: Area 1 (Veteran's Memorial Park), Area 2 (north side of Cedar Brook, between Lowden and Oakmoor Avenues), Area 3 (north side of Bound Brook, in the vicinity of Fred Allen Drive), and Area 4 (located adjacent to stream 14-14-2-3 as identified on the Flood Insurance Map for the Township of Piscataway, south of New Market Avenue and east of Highland Avenue). The investigation results are presented in the *Floodplain Soil/Sediment Sampling and Analysis Summary Report*, dated January 2000 (Weston, 2000). Area 1 samples had total PCB concentrations ranging from non-detect to 25 mg/kg, Area 2 samples had total PCB concentrations ranging from 0.060 mg/kg to 2.0 mg/kg, Area 3 samples had total PCB concentrations ranging from 2.5 mg/kg to 7.5 mg/kg, and Area 4 samples had total PCB concentrations ranging from non-detect to 0.21 mg/kg.

- 4 June, 23 June, and 28 through 30 July 1999 – Environ Corporation, on behalf of Foley, Hoag & Elliot, LLP and Mintz, Levin, Cohn, Ferris, Glovsky & Popeo, P.C. who represent D.S.C. of Newark Enterprises, Inc., conducted a preliminary evaluation of groundwater conditions at the property in June 1999. The results are presented in the *Preliminary Ground Water Assessment Report for the Hamilton Industrial Park Site,* dated October 1999 (Environ, 1999). Bedrock was encountered at depths of 6 to 13 feet bgs. Permanent groundwater was present only in the bedrock at depths between 50 and 55 feet bgs. Environ installed three temporary wells (TW03, TW05, and TW06) and collected groundwater samples using dedicated disposable Teflon bailers. TCE and 1,2-DCE were detected at concentrations as high as 29,000 micrograms per liter (ug/L) and 14,000 ug/L, respectively. Aroclor-1254 and Aroclor-1242 were detected at concentrations as high as 14 ug/L and 130 ug/L, respectively.

- April through October 2000 - A predecessor company to TtEC, Foster Wheeler Environmental Corporation, conducted a RI field program for the operable units at the site. The investigation was divided into two major phases: Site Reconnaissance and Phase I Environmental Sampling. Soil sampling from nearby residential, commercial and municipal properties occurred during the Site Reconnaissance for OU-1. The Site Reconnaissance for OU-2 focused on defining the boundaries of the disposal/fill area in the center portion of the facility and locating potential source areas. Tasks performed during this phase of work included an historical information review, geophysical survey, a soil gas survey, a drainage system survey, test pit excavations, building floor dust sampling, and an ecological resources investigation. The Phase I investigation focused on determining local geologic and hydrogeologic conditions, delineating potential source areas, and characterizing site contaminants. Tasks performed during this phase of work included the drilling of soil borings; the sampling of shallow and subsurface soils, perched water, and drainage system water and sediment; and the installation and sampling of 12 monitoring wells. PCBs were the most prevalent contaminants found, both on the nearby properties (up to 310 mg/kg total PCBs) and on the site (up to 130,000 mg/kg total PCBs). Perched water (up to 7,400 ug/L) and monitoring well groundwater (up to 84.1 ug/L) also contained PCBs. In addition, VOCs, SVOCs, pesticides, dioxins and furans, and metals were detected at concentrations above screening criteria. The results of the RI investigation were presented in the Data Evaluation Report, the OU-1 Remedial Investigation Report and the OU-2 Remedial Investigation Report (FWENC, 2001a; 2001b; 2002).

The overall results of the above sampling and analyses indicate elevated concentrations of VOCs, PCBs, and metals, along with SVOCs, pesticides, and dioxins and furans, in the site soils, sediments, and groundwater. Building interiors at the facility were found to contain elevated levels of PCBs and metals. Investigations at residential and commercial properties in the vicinity of the property identified the presence of PCBs in soils and/or in-house dust. Fish collected from Bound Brook were found to contain PCBs at concentrations higher than allowed by the Food and Drug Administration (2 parts per million (ppm)).

1.2.5 Previous Remedial Activities

To date, the following actions have been taken to reduce the potential for exposure to site contaminants and limit the migration of contaminants from the facility:

- 25 March 1997 – A unilateral administrative order was issued to the current owner of the Hamilton Industrial Park, D.S.C. of Newark Enterprises Inc., which required that a removal action be taken to stabilize the property. The scope of work included paving facility driveways and parking areas, installing security fencing and warning signs to limit access to the property, and installing silt fencing to limit off-site migration of surface soils (EPA, 1997a).

- 7 April 1997 – EPA installed temporary fencing and posted warning signs at both ends of the footpath that crossed the eastern portion of the facility property to block pedestrian access. In addition, EPA personnel overpacked several large capacitors that were leaking oil.

- 8 August 1997 – NJDEP issued an interim fish consumption advisory for Bound Brook and New Market Pond due to EPA findings of elevated PCB concentrations in sediments and fish samples (NJDEP, 1997).

- 29 March 1998 – EPA initiated a removal action to clean the interiors of homes where PCBs were found in indoor dust at levels of potential health concern, i.e., above the risk range used in the Superfund Program.

- 6 August 1998 – Cornell-Dubilier and D.S.C. of Newark Enterprises, Inc. entered into an Administrative Consent Order for a removal action that included the removal and disposal of contaminated soil from five residential properties, and delineation of the vertical and horizontal extent of PCB contamination at one additional property (EPA, 1998b).

- 8 August 1998 – NJDEP issued a final fish consumption advisory. The advisory included all parts of the Bound Brook and its tributaries, New Market Pond and Spring Lake (NJDEP, 1998).

- 23 February 1999 – EPA ordered the former owners, Cornell-Dubilier and Dana Corporation, to conduct a removal action at seven additional residential properties (EPA, 1999b).

- 28 April 1999 - A "Participate and Cooperate Order" was issued to D.S.C. of Newark Enterprises, Inc. and Federal Pacific Electric Company for the remediation of Tier II residential properties.

- 14 April 2000 - EPA ordered D.S.C. of Newark Enterprises, Inc. to conduct a removal action of contaminated soils at a property on Spicer Avenue. D.S.C agreed to perform the work required under the AOC, but subsequently failed to do so. In August 2004, EPA began the removal of PCB-contaminated soil from this property, and the work was substantially completed in September 2004.

1.2.6 Current Site Conditions

Currently, facility land use is commercial/light industrial. The Hamilton Industrial Park is located in the western portion of the former Cornell-Dubilier Electronics facility and is largely paved or occupied by buildings. All areas used as driveways, parking areas and walkways were paved by the property owner pursuant to the administrative order issued by the EPA in March 1997. Site control measures, including the installation of a six-foot chain-link fence, posting of warning signs, and implementing engineering controls to limit the migration of contaminants through surface water run-off, were also implemented pursuant to this order. It is anticipated that future land use for the facility will remain commercial and/or light industrial.

The northwestern area of the former Cornell-Dubilier Electronics facility is gently sloping, with elevations ranging from approximately 70 to 82 feet above mean sea level (msl). The central portion of the facility property is primarily an open field, with some wooded areas to the south and a semi-paved area in the fenced area in the middle. This area is relatively level, with elevations ranging from approximately 71 to 76 feet above msl. The property drops steeply to the northeast and southeast, and the eastern portion of the property consists primarily of wetland areas bordering Bound Brook. Elevations in this area range from approximately 71 feet above msl at the top of the bank to approximately 60 feet above msl along Bound Brook.

1.2.7 Geology, Hydrogeology and Hydrology

Geology

The following discussion on geology is based primarily on the results obtained from the soil borings and monitoring wells installed across the Site during the 2000 RI.

The overburden at the Site generally ranges from 4 to 15 feet in thickness and consists of dry to saturated red-brown silty sand with some medium to coarse sand, diabase, and sandstone gravel. The near-surface diabase gravel, found in a portion of the property (i.e., MW07, MW09, and MW12; see Figure 1-3 for well locations), may be related to a former rail spur, and the sandstone gravel is likely weathered residue from the underlying sedimentary formation or fill. Urban fill material is present in numerous areas at the site and consists predominantly of cinders, ash, brick, glass, metal, slag, and wood fragments.

The overburden was found to be absent beneath a number of the buildings in the northwest corner of the facility property. Its absence may be attributed to a locally high bedrock elevation and the probable removal of soil to allow for the construction of building slabs directly upon bedrock.

A weathered zone of bedrock, approximately 1 to 5 feet thick, is found beneath the overburden throughout most of the property. This limited zone consists primarily of red-brown silt to fine sand, with some siltstone gravel and silty clay, and interfingers with the urban fill material at a number of locations on-site (e.g., MW09 and MW11). In some locations (e.g., MW01A), this zone appears to be absent.

The top of the consolidated bedrock ranges from 4 to 15 feet below the surface, except in the far northwest corner where bedrock was encountered immediately underlying building slabs. The bedrock surface generally slopes to the south-southeast, and consists of the Triassic/Jurassic Passaic Formation. This bedrock unit consists predominantly of reddish-brown feldspathic mudstone and micaceous siltstone with some claystone and fine-grained sandstone. The reddish color originates from reworked hematite, which comprises 5 to 10 percent of the unit (Boch, 1959). When exposed to weathering, the Passaic units disintegrate into blocky and nodular-shaped fragments and chips that flake along the bedding plane. The shaley units ultimately disintegrate into a hard clay (Anderson, 1968). The sedimentary units of the Passaic Formation generally dip at about 5° to 15° to the northwest, and the predominant system of fractures generally strikes about N45°E. A second, less prominent system strikes approximately N75°W (Anderson, 1968).

Bedrock encountered during the 2000 investigation was described as red-brown to purplish-red mudstone and siltstone with localized beds of fine-grained sandstone. Siltstone facies occurring in alternating sequences include a bright red-brown to orange-brown friable to fissile siltstone with persistent bedding and a more resistant, red-brown to purplish-red massive silty to sandy mudstone containing deposits of fine-grained sandstone. These facies contain heavily fractured zones, generally occurring along bedding planes. Weathered fracture zones within the bedrock ranged from near vertical to horizontal; the majority of these features were low angle (i.e., 20° to 30°). Typical spacing between fractures ranged from less than one inch to six inches. Weathered pits, calcareous inclusions, vugs, and voids indicate past and present fluid movement through the formation at various depths.

At several drilling locations (i.e., MW07, MW09 and MW10), a white-gray to blue-black, fine to medium sandstone layer, interbedded with a sandy mudstone, was encountered approximately 25 to 28 feet bgs. The sandstone layer had numerous breaks and fractures. Emerald green and deep blue malachite was encountered in cores from MW03 and MW09 at depths of 32 and 25 feet bgs, respectively.

Hydrogeology

The hydrogeologic investigation focused on characterization of the shallow groundwater system in the upper portion of the Passaic Formation. Twelve bedrock monitoring wells were installed during the 2000 RI. An evaluation of the water-bearing properties of the overlying unconsolidated materials was also undertaken; however, these units do not constitute an aquifer in the vicinity of the site. Only non-contiguous limited perched water was found in the overburden.

The unconsolidated surficial deposits are relatively coarse-grained, but because of their limited thickness and perched condition above the regional water table in the bedrock aquifer, are not considered a significant hydrogeologic unit. However, these deposits can promote recharge by allowing infiltration in unpaved areas and readily transmitting water to underlying bedrock units. The weathered bedrock zone may inhibit this recharge.

The Passaic Formation is a multi-unit leaky aquifer system that consists of thin water-bearing bedrock units separated by thick intervening confining beds. The units have little primary porosity or permeability as a result of compaction and cementation. The principal means of groundwater flow within the Passaic Formation is through secondary permeability resulting from a series of interconnected fractures. The upper part of the Passaic Formation aquifer system is typically unconfined. However, near-surface bedrock units are usually highly weathered. Silt and clay derived from the weathering process typically fill fractures, thereby reducing permeability. This relatively low permeability surface zone reportedly extends 50 to 60 feet bgs (Michalski, 1990). Groundwater in the lower portion of the Passaic Formation is generally semiconfined. Recharge is by leakage through fractures in the confining units (Houghton, 1990).

During the drilling, installation, and development of on-site monitoring wells, water-bearing zones were identified primarily between approximately 35 to 50 feet bgs (elevations between 25 to 40 feet msl) except at MW03, where they were encountered at 20 to 25 feet bgs (45 to 50 feet msl). Groundwater yields during monitoring well development varied from less than a gallon (e.g., MW01A, MW02A, MW10, and MW11) to several gallons per minute (e.g., MW03).

Groundwater elevations were collected on 9 October and 24 October 2000, and based on the potentiometric surface contours, it appears that groundwater generally flows at an average gradient of approximately 0.0035 to 0.0040 feet per foot (ft/ft) to the northwest. Groundwater elevation data collected on 7 March 2001, during seasonally high water levels, indicates a groundwater flow gradient of approximately 0.0015 to 0.0020 ft/ft, approximately half the gradient calculated for the October groundwater elevations, which were collected during seasonally low water levels.

Stream gauge measurements collected east of the facility property indicate the water level in the Bound Brook was typically higher than the groundwater elevation in nearby monitoring well MW05 (e.g., by 1.48 feet and 0.85 feet on 24 October 2000 and 7 March 2001, respectively). This observation suggests that the Bound Brook is recharging the upper bedrock aquifer in that portion of the site.

It appears groundwater flow beneath the facility property is generally in a northwesterly direction and may flow beneath the Bound Brook beyond the northern extent of the project site.

Hydrology

The saturated conditions encountered during the 2000 RI investigation at select locations and the high percentage of silt and clay present in the soils suggest that a seasonally-influenced, discontinuous perched water table exists in the unconsolidated material across parts of the facility. Although not a significant hydrogeologic unit, the perched water table may recharge the underlying bedrock aquifer.

Seven wetlands (four Palustrine Emergent, two Palustrine Emergent/Palustrine Scrub-Shrub, and one Palustrine Forested Broad Leaved Deciduous) were delineated at the facility during the 2000 RI. Wetland acreage ranged from 0.02 acres to 1.03 acres. Four of the wetlands are located adjacent to Bound Brook, and three are in the southwestern portion of the facility. The remainder of the facility property consists of successional fields, broad-leaved deciduous forests, and developed land.

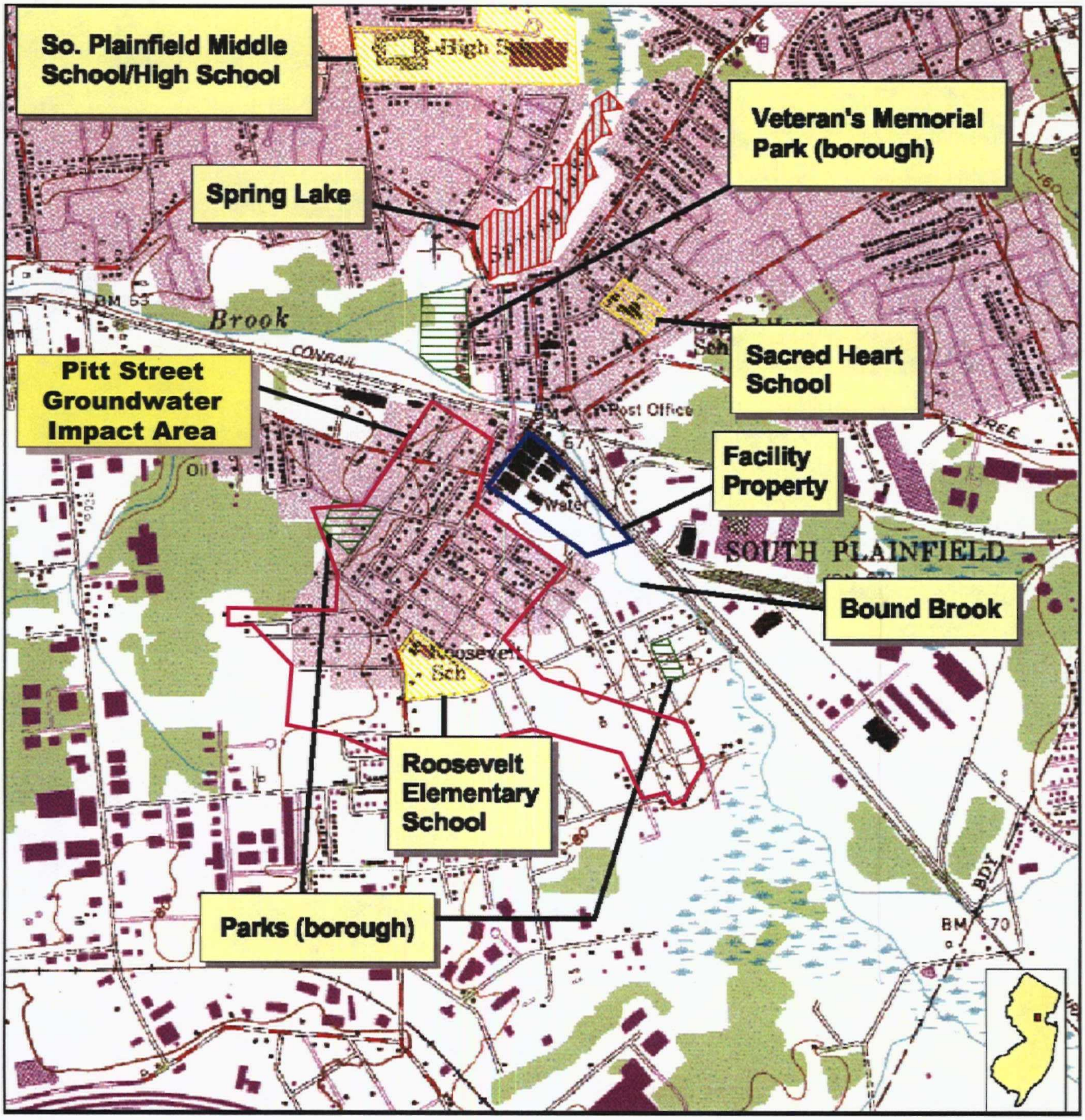
Most of the facility, including the portion containing the buildings and structures, lies outside of the flood hazard area, and the 100- and 500-year floodplains. The southeastern portion of the property, however, is located within the flood hazard area, and the 100- and 500-year floodplains of Bound Brook.

TABLE 1-1

CONSTRUCTION AND USAGE HISTORY OF STRUCTURES AT THE CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE

Building No. (Figure 1-2)	Building No. (1956 Survey)	Year Constructed	Usage/Functional Space*
1	1	1911-1918	Offices, Storage, Staking Etching
1A	1	1911-1918	Offices, Staking Testing
1B	1	1911-1918	Staking Testing, Forming Tanks, Spray Booth
1C	1	1911-1918	Staking Testing, Forming Tanks, Reactors
2	2	1917	Storage, Spray Booth
2A	2	1917	Ageing Racks
3	16	1918	First Aid, Photo Gravure Dept.
4	14, 15, 16	1917, 1918, 1918	Photo Gravure Dept., Plating, Storage, Shipping
4A	14, 15	1917, 1918	Storage, Shipping, Sub-assembly
5	28	1946	Capacitor Manufacturing, Test House, Winding Room
5A	28	1946	Office, Spray Booth, Drying Area
6	3	1918	Wax Room
7	17	1916	Carpentry Shop
8	29	1950	Electric Generator Area, Forming and Edging Tanks
9	22	1918	Etching, Forming Tanks, Washing & Ageing
9A	6, 22	1917, 1918	Etching, Forming Tanks, Generator Room
9B	6	1917	Forming Tanks, Generator Room, Glycol Impregnating, Switch Room
9C	22 ADD	1950	Unknown
10	24	1918	Oil House
11	30	1950	Unknown
12	31	1950	Unknown
13	8	1912	Machine Shop
14	5	1910	Storage
15	9	Unknown	Engine Room for Boiler House
16	9	Unknown	Boiler House
18	9	Unknown	Engine Room/Boiler House

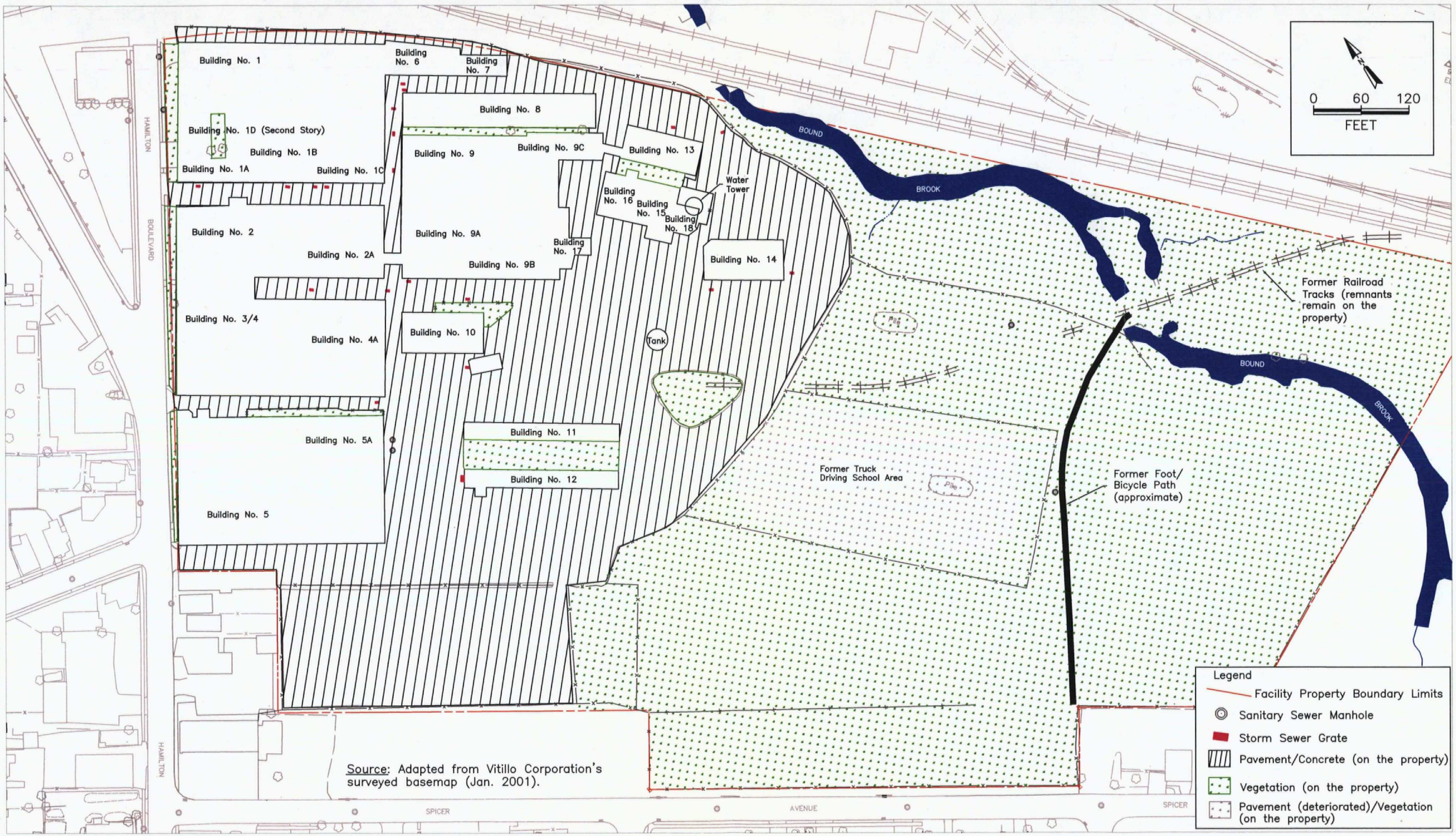
*Usage/Functional Space is for the period of 1956 when Cornell-Dubilier Electronics was occupying the property.



SOURCE: US Geological Survey 7.5-minute topographic map for Plainfield, New Jersey.

	TITLE:	DWN: CTS / LEA	DES.: LEA	PROJECT NO.: 1945.2154
TETRA TECH EC, INC.	SITE LOCATION MAP CORNELL–DUBILIER ELECTRONICS SUPERFUND SITE	CHKD: LEA	APPD: LH	FIGURE NO.: 1–1
		DATE: 12/14/05	REV.: 0	

N: \GIS\GISKey\GISProj31\Cornell–Dubilier\OU3 Oversight Work Plan Figures\Figure 1–1 (site location).dwg

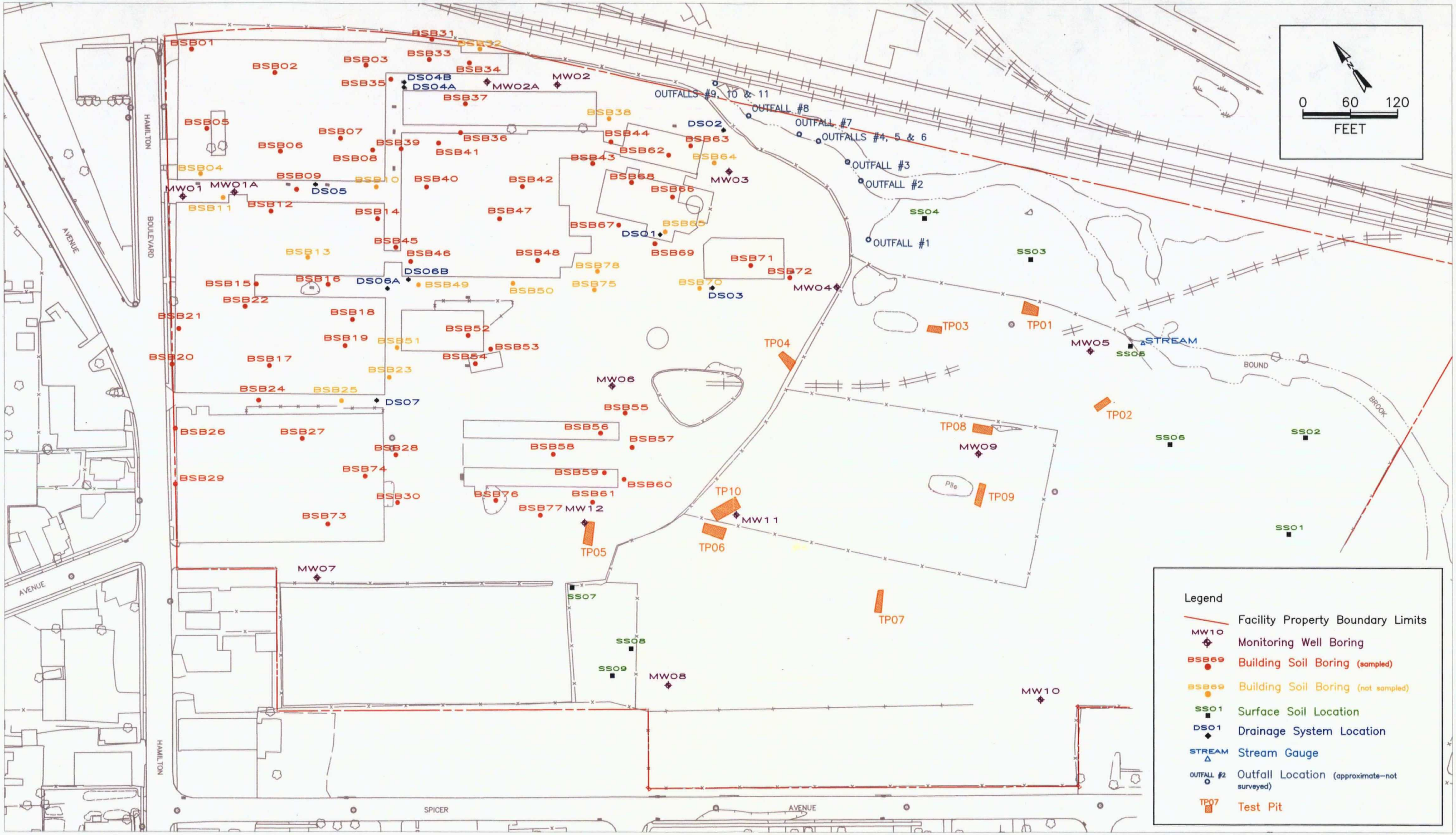


TETRA TECH EC, INC.

TITLE: Facility Property Map
Cornell-Dubilier Electronics Superfund Site

DWN.: CTS	DATE: 12/14/04	PROJECT NO.: 1945.2154
CHKD: LEA	REV.: 3	FIGURE NO.: 1-2
DES.: LEA	APPD: LH	

N:\GIS\GISKey\GISProj31\Cornell-Dubilier\OU3 Oversight Work Plan Figures\Figure 1-2 (site map).DWG



TETRA TECH EC, INC.

TITLE:
Sampling Locations from 2000 Remedial Investigation
Cornell–Dubilier Electronics Superfund Site

DWN.: LEA	DATE: 12/14/05	PROJECT NO.: 1945.2154
CHKD: LH	REV.: 3	FIGURE NO.: 1–3
DES.: LEA	APPD: LH	

N:\GIS\GISKey\GISProj31\Cornell-Dubilier\OU3 Oversight Work Plan Figures\Figure 1-3 (sample locations).DWG

2.0 SUMMARY OF SITE CONTAMINATION

2.1 Operable Unit 1

Soil sampling was conducted at 19 properties and 13 right-of-ways (ROWs) in the vicinity of the Cornell-Dubilier Electronics facility during the OU-1 portion of the 2000 RI. Shallow (0 to 2 inches bgs) and deeper (between 4 and 18 inches bgs depending on property/ROW) soils were collected to further delineate the extent of off-site soils contamination.

PCBs, specifically Aroclor 1254 and 1260 were detected in soil samples collected from the 19 properties. Concentrations of Aroclor detected ranged from 0.005 mg/kg to 310 mg/kg and detections of Aroclor 1260 ranged from 0.024 mg/kg to 44 mg/kg.

The results from the RI also indicated that five ROWs had at least one sample exceeding the EPA Soil Screening Level (SSL) of 1 mg/kg Total PCBs.

2.2 Operable Unit 2

2.2.1 Historical Information Survey, Geophysical Survey and Soil Gas Survey

An evaluation of available historical information was performed to determine potential contaminant source areas. In addition, a geophysical survey and a soil gas survey were conducted. From the northeastern portion of the central section of the site to the embankment leading to Bound Brook, the geophysical data suggest that there is an increased metallic component to the shallow buried material.

The main contaminant of concern detected during the soil gas survey was TCE. TCE was present across most of the developed, paved portion of the facility, along with several of its chlorinated breakdown products. Four areas of elevated chlorinated hydrocarbon occurrences (i.e., sum total greater than 100 ug/L) were noted, including near the northeastern corner of the former truck driving school fence; in the vicinity of the southwestern corner of the former truck driving school fence; to the southwest of Building No. 12; and to the northeast of Building No. 11.

Areas with elevated soil gas concentrations and/or where the geophysical survey indicated buried material were typically investigated further during the test pit excavations, monitoring well boring activities, and building soil boring activities.

2.2.2 Test Pit Excavations

Ten test pits were excavated within the central portion of the facility (see Figure 1-3), and various types of debris were noted during the excavations. General construction/demolition debris, such as bricks, wood, concrete, etc., was present in a majority of the test pit locations. TP01, located in the east-northeastern portion of the facility along the embankment, contained scrap metal, automobile parts, and steel cable. Miscellaneous metallic debris was also excavated from TP02, including sheet metal, steel blocks, and metal buckets. In addition, test pit TP02 was found to contain ceramic electrical parts and drum components.

Capacitors, denoted as "electrical boxes" on the Test Pit Records, were unearthed during excavation of locations TP06, TP08, and TP09. These three test pits were located in anomalous areas from the geophysical survey, confirming the geophysical interpretation of buried metallic material. Further inspection of the TP08 and TP09 capacitors, performed by EPA and TtEC personnel after test pit removal, revealed that some of the capacitor boxes appeared corroded and/or partially burned. Other indications of disposal in these areas were the presence of white and blue crystalline powder (TP08 and TP10), "mica-like" and "battery-shaped" pieces of material (TP08), 2-inch long white cylindrical objects (TP09), 5-inch diameter cardboard disks (TP09), and ceramic electrical components (TP09).

In comparison to the other excavations, debris was not noted in test pits TP04 and TP05. TP04 contained dark brown ash-like material within the upper 3 feet. Additionally, a pocket of light gray ash-like material, approximately 3 feet wide and up to 1 foot thick, was observed in the western portion of the test pit. Gravel layers were found in TP05, with light gray gravel present from approximately 0.5 to 2 feet bgs and dark gray gravel present from approximately 2 to 3 feet bgs on the northern side of the test pit and almost non-existent on the southern end. An oily water seep appeared within this dark gray gravel layer, approximately 3 feet from the northern end of TP05.

2.2.3 Building Floor Dust Investigation

Aroclor-1254 was detected in all of the floor dust samples collected, and concentrations ranged from 4.9 mg/kg in a sample from Building No. 3/4 to 8,300 mg/kg in a sample from Building No. 1. The more elevated concentrations of Aroclor-1254 (i.e., greater than 500 mg/kg) were present in Building Nos. 1, 1B, 5, and 6. A majority of these high concentration samples were collected from bare floors in warehouse or production areas of the buildings.

With the exceptions of selenium and thallium, all of the TAL metals were detected in at least one of the samples collected from each of the facility buildings. Selenium and thallium were present in 19 and 12 leasable spaces, respectively. A discernible, consistent concentration pattern was not generally present for the detected metals. Elevated concentrations varied across the locations, with maximum metal values present in 14 different building spaces. Typically, the floor dust samples from Building Nos. 1, 2A, 5, 9, 9C, 14, and/or 15 contained numerous metals (e.g., arsenic, lead, mercury) at higher concentrations (although not necessarily the maximum value for a specific individual metal). With the exceptions of samples BFD01-01 and BFD15-01, which were collected from carpeted floors, these buildings had bare floors.

2.2.4 Soils and Perched Water Investigation

The nature and extent of contamination for the facility soils and buildings was assessed as part of the OU-2 remedial investigation. Screening criteria were used to assist in the interpretation of the nature and extent of contamination. The specific screening criteria that were used for comparison are discussed in the OU-2 Remedial Investigation Report (FWENC, 2002).

To investigate the potential source areas and determine the extent of soil contamination for the facility, various sampling events occurred during the field investigation. The results of these investigations were separated into shallow (i.e., 0 to 2 feet below ground surface/cover) and subsurface (i.e., greater than 2 feet below ground surface/cover) soils. The facility was divided into six general areas for ease of discussion, as follows: northern developed portion, southern developed portion, southwestern undeveloped portion, central undeveloped portion, northeastern undeveloped portion, and floodplain undeveloped portion.

Shallow Soils

Polychlorinated Biphenyls

PCBs were present in the shallow soils across the entire facility. Only six of the samples contained non-detectable levels of these compounds (i.e., a frequency of detection of approximately 0.94), and all of these locations were in the northern developed area. With the exceptions of Aroclor-1242 and Aroclor-1260, the northern developed and the southwestern undeveloped portions generally had lower concentrations of PCBs than the other four sampled areas. Aroclor-1242 was present just in the northern and southern developed portions. Aroclor-1260 was detected in the shallow soils of only the northern developed and southwestern undeveloped portions of the facility. However, all six areas contained concentrations of both individual Aroclor constituents and Total PCBs exceeding screening criteria by factors ranging from 1.1 to 51,000.

The shallow soil from two sample locations in the floodplain undeveloped portion, SS02 and SS03, underwent analysis for PCB congeners. Of the 94 congener compounds or compound combinations analyzed by the off-site laboratory, 61 were present in the shallow soils. Location SS02 contained congener concentrations ranging from 0.65 micrograms per kilogram (ug/kg) to 49 ug/kg, with a total PCB congener concentration of 460 ug/kg. Congeners were generally present at more elevated levels (*i.e.*, between 81 ug/kg and 6,000 ug/kg) in the shallow soils from SS03. Total PCB congeners in this sample summed to 53,000 ug/kg.

Dioxins/Furans

Due to the presence of charred debris in the test pits and the fact that burning PCBs can result in the generation of dioxins/furans, a limited set of soil samples were subjected to dioxins and furans analysis. Three shallow soil samples (SS02, SS03, and MW09) were analyzed for dioxins and furans, and all three of the locations contained detectable concentrations of these compounds. Concentrations were generally lowest in SS02 (floodplain undeveloped portion) and highest in MW09 (central undeveloped portion). Individual dioxin/furan constituents ranged up to 173 picograms per gram (pg/g) in SS02, up to 2,520 pg/g in SS03, and up to 13,510 pg/g in MW09. The maximum concentrations for the dioxin/furan homologs (i.e., compounds with an equal number of chlorine substitutions) were 4,430 pg/g (SS02); 14,420 pg/g (SS03); and 52,850 pg/g (MW09). 2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) is the only constituent in this class of compounds with a screening criterion (i.e., 3.15 pg/g). 2,3,7,8-TCDD was detected in the shallow soils from both SS03 (10.1 pg/g) and MW09 (56.7 pg/g) at concentrations above this value.

Volatile Organic Compounds

A total of 30 individual VOCs were detected in the shallow soils, and a majority of these constituents (i.e., 23 of the 30; or 77 percent) were present at concentrations less than their respective screening criteria values. In addition, the VOCs were relatively infrequently detected (*i.e.*, 26 VOCs had frequencies of detection less than 0.20; or 87 percent); exceptions included cis-1,2-DCE (0.26), acetone (0.35), toluene (0.50), and TCE (0.59). Seven VOC compounds (cis-1,2-DCE, trans-1,2-DCE, 1,2,4-trichlorobenzene, methylene chloride, PCE, TCE, and vinyl chloride) occurred above screening criteria. The only exceedance concentration of 1,2,4-trichlorobenzene (5,900 ug/kg) was detected in test pit TP10, and methylene chloride was present above its screening criterion only in shallow soil location SS04 (1,700 ug/kg). The more elevated concentrations of the other VOCs exceeding screening criteria were present in the southern developed (MW06/BSB61), central undeveloped (TP10/MW11) and/or floodplain (SS04) portions of the facility.

Semi-Volatile Organic Compounds

Thirty-two SVOC compounds were detected within the shallow soil samples collected during the OU-2 RI sampling. Frequencies of detection ranged from 0.01 (2-chloronaphthalene, caprolactam, and hexachlorobenzene) to 0.69 (fluoranthene, phenanthrene, and pyrene). In general, two classes of semi-volatile constituents - phthalate compounds and PAH compounds - constituted a majority of the occurrences. Thirteen individual PAH compounds, biphenyl and carbazole had concentrations greater than their respective shallow soil screening criteria values. The more elevated concentrations and the higher number of exceeding compounds occurred for the southern developed portion (MW06/BSB55) and the southwestern undeveloped portion (SS09). The "hot spot" in the middle of the southern developed portion partially coincides with the elevated non-chlorinated soil gas results. The sample collected from SS09, in the location of the second, smaller "hot spot," had the appearance of semi-dried tar with a discernible petroleum-based odor, and this likely accounts for the elevated amounts of PAHs. In addition, this part of the southwestern undeveloped portion appeared to contain debris and other objects during review of the aerial photographs.

Pesticides

Nineteen pesticides were detected across the facility during the shallow soil investigation. The northern developed and southern developed portions had the highest number of constituents (i.e., 18 and 16 pesticides, respectively). Of the 19 detected pesticides, 12 were present at concentrations above screening criteria, and exceedances were found in all portions of the facility. The distribution of concentrations for a majority of the pesticides was similar, with the more elevated concentrations typically appearing in the following areas: boundary of the northeastern undeveloped portion and the floodplain undeveloped portion (SS03/SS05/MW05), eastern corner of the central undeveloped portion (MW09), western corner of the central undeveloped portion (MW11/TP10), southern corner of the southern developed portion near Building Nos. 11 and 12 (BSB56/BSB57/BSB59/BSB60/BSB61), and/or the northern corner of the northern developed portion in Building No. 1 (BSB02/BSB03). Additional elevated concentrations were noted for specific pesticides, such as aldrin in MW06 (55,000 ug/kg), endrin in BSB41 (26,000 ug/kg in the sample from between the concrete layers), and heptachlor in BSB24 (32,000 ug/kg).

Metals and Cyanide

The shallow soils contained detectable concentrations of 23 metals and cyanide, and most of the metals with available screening criteria exceeded their respective values across the entire facility. Cyanide was not detected above its screening criterion value. A majority of the maximum concentrations for the inorganic constituents (i.e., 18 of 24, or 75 percent) was present on the developed portion.

The undeveloped portion of the facility also showed exceedances for many metals; locations for these elevated concentrations were generally dependent on the particular metal constituent contoured. For example, both arsenic and cadmium had a "hot spot" within the central undeveloped portion, near MW11. Chromium, although also present at a relatively high concentration near MW11, was even more elevated in the floodplain soils of SS01, SS03, and SS04. Lead, in comparison, was present in the eastern corner of the facility, from the northwest corner of the central undeveloped portion (RA-S5-SS5) to the northeastern undeveloped portion (MW05), and within the floodplain undeveloped portion (RA-S6-SS6).

Subsurface Soils

Polychlorinated Biphenyls

PCBs were detected throughout the subsurface soils of the facility, at detection frequencies up to approximately 0.90. Only six of the 59 samples did not contain a detectable amount of any individual Aroclor constituent, and these samples were located in the northern developed area (five samples) or the southwestern undeveloped area (one sample). With the exception of the southwestern undeveloped area, all of the sampled areas contained concentrations of both individual Aroclors and Total PCBs exceeding screening criteria, by factors up to approximately 265,000.

Three subsurface soil samples (4 to 6 feet bgs from MW04, 8 to 10 feet bgs from MW09, and 4 to 6 feet bgs for MW11) underwent PCB congener analysis; details are provided in Table 4-10 of the OU-2 Remedial Investigation Report (TtEC, 2002). Of the 94 congener compounds or compound combinations analyzed by the off-site laboratory, 65 and 72 constituents were present in the subsurface soils from the southern developed (MW04) and central undeveloped (MW09/MW11) portions, respectively. The 4 to 6-foot soils from MW04 contained congener concentrations between 0.95 ug/kg and 77 ug/kg, with a total PCB congener concentration of 770 ug/kg. Congeners were generally present at concentrations at least an order of magnitude higher in the MW09 soils (i.e., from 16 ug/kg to 1,800 ug/kg for the individual compounds or compound combinations, and 15,000 ug/kg for the total). The most elevated concentrations, though, were present in the 4 to 6-foot soils collected from MW11. This sample contained PCB congener compounds or compound concentrations up to 2,200,000 ug/kg (BZ 110/77). Total PCB congeners in the MW11 sample summed to 39,000,000 ug/kg.

Dioxins/Furans

None of the subsurface soil samples were analyzed for dioxin and furan compounds during the OU-2 RI investigation.

Volatile Organic Compounds

The subsurface soils contained 32 identifiable VOCs, and frequencies of detection for seven VOCs were greater than 0.20, as follows: trichlorofluoromethane at 0.22; xylenes at 0.24; 1,1,1-

trichloroethane (TCA) at 0.27; cis-1,2-DCE at 0.32; acetone at 0.37; toluene at 0.37; and TCE at 0.53. The remaining constituents had detection frequencies ranging between 0.02 and 0.20. Twenty-four of the VOC constituents were present at concentrations less than their respective screening criteria. Eight VOC compounds (1,2-dichloropropane; 1,1-DCE; cis-1,2-DCE, 1,2,4-trichlorobenzene, methylene chloride, PCE, TCE, and vinyl chloride) occurred above screening criteria. Six of these eight VOCs were also detected at concentrations greater than screening criteria values in the surface soil. A majority of the exceedances, and those with the most elevated concentrations, were present in the southern developed (MW04/MW06/MW12/TP04/TP05) and/or central undeveloped (MW11/TP06/TP08) portions of the facility. In addition, one occurrence each for methylene chloride (21 ug/kg) and TCE (110 ug/kg) in the northern developed portion exceeded screening criteria, along with one occurrence for TCE (220 ug/kg) in the northeastern undeveloped portion.

Semi-Volatile Organic Compounds

A total of 29 individual SVOCs were detected during the subsurface soil investigation. A majority of these constituents (i.e., 22; or 76 percent) are PAH, phthalate or phenolic compounds. Frequencies of detection in the subsurface soils ranged between 0.02 (2,4-dimethylphenol, 2-chloronaphthalene, butyl benzyl phthalate, diethyl phthalate, pentachlorophenol, and phenol) and 0.37 (pyrene). The subsurface soils contained exceedance concentrations of 12 SVOCs (mostly PAHs). With the exceptions of nine relatively low concentration exceedances (i.e., less than 425 ug/kg) of benzo(a)pyrene, the SVOC concentrations that were greater than their respective screening criteria were detected from four locations: MW06 (2 to 4 feet bgs) in the southern developed portion, TP01 (approximately 6.5 feet bgs) and TP02 (approximately 4 feet bgs) in the northeastern undeveloped portion, and TP06 (approximately 8 feet bgs) in the central undeveloped portion.

Pesticides

Eighteen pesticides were detected in the subsurface soils; however, their frequencies of detection were relatively low (i.e., range: 0.02 to 0.29). Concentrations of 11 of the pesticides were above their respective screening criteria values, and exceedances were present in all of the sampled facility areas except the southwestern undeveloped portion. Elevated concentrations were typically found in the same areas of the facility as during the shallow soil investigation, as follows: boundary of the northeastern undeveloped portion and the floodplain undeveloped portion (MW05), eastern corner of the central undeveloped portion (MW09/TP09), western corner of the central undeveloped portion (MW11), and/or the northern corner of the northern developed portion in Building No. 1 (BSB08). Additional elevated concentrations were noted for specific pesticides, such as aldrin in MW06 (maximum of 53,000 ug/kg) and MW12 (maximum of 7,000 ug/kg); and endrin aldehyde in TP05 (3,700 ug/kg), TP06 (16,000 ug/kg) and TP08 (27,000 ug/kg).

Metals and Cyanide

The subsurface soils of the facility contained detectable concentrations of all 23 metals analyzed and cyanide. Maximum concentrations for over half of these constituents (i.e., 14 of 24; or 58 percent) were detected in the central undeveloped portion. This is in opposition to the maximum concentrations present in the shallow soils which trended to the developed portion of the facility. Of the 16 constituents with available screening criteria, 12 exceeded their respective values in at least one portion of the facility, and exceedances were detected above criteria values up to a factor of 838 (arsenic).

Non-Aqueous Phase Liquid

The potential for a non-aqueous phase liquid (NAPL) to exist in the soils was evaluated as part of the OU-2 RI. For soils, if greater than 10,000 mg/kg of contamination exists (i.e., one percent of the soil mass), then a NAPL may be present (Bedient et al., 1994).

Total PCBs were detected above 10,000 mg/kg in the following three locations: MW09 at 4 to 6 feet bgs (130,000 mg/kg); MW11 at 6 to 8 feet bgs (10,600 mg/kg); and TP09 at 5 feet bgs (29,000 mg/kg). MW09 and TP09 are located in the eastern corner of the central undeveloped portion of the facility, while MW11 is present in the western corner. Therefore, the potential exists for a NAPL to be present in the eastern part (MW09/TP09), and to a lesser extent the western part (MW11), of the central undeveloped portion of the facility. Significant accumulation of NAPL was not present in the descriptions of the MW09, MW11 and/or TP09 samples; some coloration of the soils (MW09, TP09), an "oily sheen" on the split-spoon (MW11) and/or staining and an odor (TP09) were noted. In addition, staining, "oily sheen" and/or odors were also observed in other sample locations such as TP03, TP08, MW02A, and MW06.

Perched Water

Water encountered in the overburden soil and weathered bedrock intervals during field activities was sampled to characterize potential source areas, to evaluate potential zones of contamination, and to identify potential contamination migration pathways.

Polychlorinated Biphenyls

The perched water samples contained three individual PCB constituents (Aroclor-1242, Aroclor-1248 and Aroclor-1254), and detected concentrations ranged from 0.65 ug/L to 5,100 ug/L. All of the occurrences exceeded screening criteria by factors up to 10,200. The northeastern undeveloped portion (TP03) and the contiguous boundary of the southern developed portion (MW04) had the least amount of PCBs in the perched water (i.e., 2.35 ug/L Total PCBs and non-detect, respectively). The most elevated Total PCB concentrations were present in the central undeveloped portion of the facility (*i.e.*, up to 7,400 ug/L). Location MW11, and to a lesser degree test pits TP10 and TP09, contained the highest amounts of Total PCBs in the perched water. These "hot spot" areas also contained the more elevated concentrations of PCB constituents in the soils. The elevated concentrations (*i.e.*, up to ppm levels) of chlorinated VOCs in both the subsurface soil and the perched water within and/or immediately adjacent to these areas have likely contributed to the leaching and solubilization of the PCB constituents through co-solvent effects.

Two perched water samples, from monitoring well borings MW11 and MW12, were analyzed for PCB congeners, and 74 individual congener compounds/compound combinations were detected; details are provided in Table 4-11 of the OU-2 Remedial Investigation Report (TtEC, 2002). Location MW11, in the central undeveloped portion of the property, contained congener concentrations in the perched water ranging from 2.9 ug/L to 240 ug/L, with a total PCB congener concentration of 3,200 ug/L. The concentrations present in MW12 were relatively similar in magnitude, as individual occurrences were between 2.2 ug/L and 190 ug/L, and total PCB congeners summed to 2,300 ug/L.

Volatile Organic Compounds

Nineteen VOC compounds were identified in the perched water samples, and detected concentrations ranged from 0.4 ug/L (1,1,2,2-TCA; benzene) to 15,000 ug/L (TCE). Locations MW11 and MW12 contained the highest number of constituents (i.e., both samples contained 17 VOCs) and the most elevated concentrations (i.e., the samples contained maximum concentrations for 53 percent of the detected VOCs, at levels up to 15,000 ug/L). Screening criteria exceedances for the perched water occurred for a total of 10 compounds, including: 1,2,4-trichlorobenzene; 1,4-dichlorobenzene; chlorobenzene; 1,1-DCE; cis-1,2-DCE; trans-1,2-DCE; methylene chloride; PCE; TCE; and vinyl chloride. Six, two and nine VOCs, respectively, were detected at concentrations above screening criteria in the southern developed, northeastern undeveloped and central undeveloped portions. A majority of these constituents (i.e., 8 of 10, or 80 percent) were also present in the surface and/or subsurface soils of these areas at concentrations exceeding soil screening criteria values, indicating the VOCs in the perched water samples are likely related to the direct dissolution of these constituents from the soils.

Semi-Volatile Organic Compounds

The perched water samples collected from the test pits contained 26 identifiable SVOCs, including phenols, PAHs, and phthalate esters. Individual compound concentrations were relatively low (i.e., the detected range was between 1 ug/L and 35 ug/L). Screening criteria exceedances occurred for the following seven PAH compounds in locations TP03 and/or TP06: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene. PAHs were detected in the soils above screening criteria, and co-solvency mediated by the VOC constituents present increases the likelihood that these constituents may become solubilized by percolating rainwater.

Pesticides

Ten pesticides were detected in the test pit perched water samples. TP03 in the northeastern undeveloped portion contained relatively low concentrations of these compounds, as the detected range was only from 0.02 ug/L to 0.2 ug/L. Pesticide concentrations in the central undeveloped portion of the facility (TP06/TP08/TP09/TP10) were more elevated (i.e., between 0.87 ug/L and 33 ug/L). Exceedance concentrations occurred for six of the ten pesticides (i.e., 4,4'-DDE; aldrin; alpha-BHC; dieldrin; gamma-chlordane; and heptachlor), and these concentrations were detected up to 825 times greater than screening criteria.

Metals and Cyanide

The test pit water was also analyzed for inorganic constituents, and 22 metals and cyanide were detected. Concentrations typically followed the same distribution pattern as SVOCs and pesticides (i.e., detected at more elevated concentrations in the central undeveloped portion when compared to the northeastern undeveloped portion). Aluminum, iron, lead, and manganese were present in TP03 (northeastern undeveloped portion) at concentrations above their screening criteria values. Test pits TP08 and TP09 also contained exceedances of these four metals, plus arsenic and cadmium in TP08 only. A total of 14 metals had concentrations up to 1,190 times greater than screening criteria in TP06 and/or TP10.

Non-Aqueous Phase Liquid

The existence of NAPL was evaluated based on the disposal practices at the facility and VOC (particularly TCE) concentrations detected during the perched water investigation. It is a general rule that if a constituent is detected at a concentration greater than one percent of its solubility in a water sample, then a NAPL may be present (Bedient et al., 1994). Using the maximum possible solubility value for the individual Aroclor constituents detected at the site (3.4×10^{-1} mg/L), the "one percent rule" solubility value for comparison would be 3.4×10^{-3} mg/L, or 3.4 ug/L. With the exceptions of MW04 and TP03, all of the sampled locations had PCB concentrations in the perched water above 3.4 ug/L. The most elevated Total PCB concentration, detected in MW11, was over 2,000 times this comparison solubility value. TCE has a water solubility of 1.1×10^{3} mg/L; one percent of this value would be 1.1×10^{1} mg/L, or 11,000 ug/L. Two locations, MW11 and MW12, contained TCE at concentrations greater than this comparison solubility value. Therefore, the potential exists for a NAPL to be present, especially in the vicinity of MW11 and MW12. During the OU-2 field investigation, no significant accumulation of NAPL was discovered for the perched water. Sheens were observed on the water infiltrating TP09 and BSB58, and location TP05 contained an "oily water seep" three feet from the end of the test pit.

2.2.5 Drainage System Investigation

Samples of representative drainage system locations around the developed portion of the facility were collected to determine the level of contamination in the facility drainage system and the potential for the system to be a source and/or facilitated transport mechanism for contamination. Five sediment samples (and one duplicate sample) and six standing water samples (and one duplicate sample) were analyzed.

Polychlorinated Biphenyls

The five catch basin sediment sample locations contained relatively elevated concentrations of PCBs, and all of these occurrences exceeded screening criteria. Individual constituent concentrations ranged from 10,000 ug/kg (Aroclor-1254 in DS01) to 140,000 ug/kg (Aroclor-1254 in DS04B). Total PCBs summed to a maximum of 210 mg/kg in the sediments from location DS07. PCBs were also detected in the drainage system water, again above screening criteria in all occurrences. Samples contained Aroclor-1248, Aroclor-1254, and/or Aroclor-1260 at concentrations between 0.13 ug/L (DS05) and 11 ug/L (DS02). Although PCBs typically have low aqueous solubilities, the elevated concentrations noted in the drainage system water samples may be due to co-solvent effects exerted by other dissolved organic constituents (*e.g.*, TCE, methylene chloride). In addition, the procedures to collect the drainage system water may also have generated sufficient suspended sediment particulates to increase the amount of PCBs detected in the water during analysis.

Volatile Organic Compounds

Seventeen VOCs were detected in the drainage system samples, with 10 and 12 compounds present in the sediment and water, respectively. Occurrences of individual VOCs in the drainage system sediments were at relatively low concentrations (i.e., less than 70 ug/kg), and none of the VOCs were present above screening criteria. Detected standing water concentrations ranged from 0.3 ug/L (chlorobenzene) to 27 ug/L (TCE), and VOCs were detected in all of the samples except DS05. Exceedances of screening criteria occurred for four constituents: methylene chloride (13 ug/L in DS02 and DS04A), TCE (2 ug/L in DS03 and 27 ug/L in DS06A), PCE (0.4 ug/L in DS06A), and vinyl chloride (0.9 ug/L in DS01 and 0.4 ug/L in DS03).

Semi-Volatile Organic Compounds

The detected SVOCs in the drainage system samples were generally phthalate esters, or PAHs. The sediment samples contained phthalate compounds up to 13,000 ug/kg (bis(2-ethylhexyl)phthalate in location DS05); however, there were no exceedances of screening criteria for these compounds. Bis(2-ethylhexyl)phthalate was present in the standing water sample from DS01 (which is the sump pit located in the basement of Building No. 15), at an exceedance concentration of 10 ug/L. Seventeen PAHs were detected in the drainage system sediments, and constituent concentrations ranged from 150 ug/kg to 11,000 ug/kg. The maximum concentrations for the individual PAHs were mainly present in DS05 (i.e., 10 of the 17; or 59 percent), where a sheen was visible on the water after disturbance of the sediment layer and a petroleum odor was noted during sampling. Seven compounds (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, carbazole, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene) had sediment concentrations above their respective screening criteria values. PAHs were not detected in the drainage system water collected as part of the OU-2 RI.

Pesticides

A total of 11 pesticides was present in the drainage system sediment samples. Detected concentrations in the catch basin sediments ranged from 58 ug/kg (alpha-BHC) to 33,000 ug/kg (DDT), and the more elevated sediment concentrations generally occurred in DS04B and/or DS07. Exceedances occurred at all of the sampled locations, and 9 of the 11 pesticides detected in the drainage system sediments were present above screening criteria. The drainage system water sample from DS03 contained gamma-BHC (0.036 ug/L). Three pesticides (alpha-BHC at 0.012 ug/L, gamma-BHC at 0.024 ug/L and heptachlor at 0.028 ug/L) were detected in the DS06A sample. All of these occurrences were above the most conservative surface water screening criteria.

Metals and Cyanide

All 24 inorganic constituents (23 metals and cyanide) were detected in the drainage system sediments. Of these, 14 had concentrations that were above their respective screening criterion values. These constituents were also present in site shallow soils at exceedance concentrations, and deposition of soil particles from storm water run-off likely accounts for their presence in the drainage system sediments.

The drainage system water contained occurrences of 20 metals, with nine constituents (aluminum, arsenic, chromium, copper, iron, lead, manganese, mercury, and zinc) detected at concentrations exceeding screening criteria. At least a portion of the metal concentrations in the water samples may be related to suspended sediment particulates generated during sampling activities.

2.3 Operable Unit 3

This summary of groundwater analytical results is based on samples collected from bedrock monitoring wells installed at the former Cornell-Dubilier Electronics facility during the initial 2000 RI. Elevated concentrations of VOCs and PCBs were noted around the facility property, and specifically in locations MW07, MW08, MW11, and/or MW12. Table 2-1 presents the VOC and PCB compound occurrences in the on-site bedrock groundwater. Maximum concentrations were generally detected in MW11 for the VOCs (e.g., Cis-1, 2-DCE at 190,000 ug/L and TCE at 120,000 ug/L) and MW12 for PCBs (e.g., Aroclor-1232 at 80 ug/L with total PCBs of 84 ug/L). Analysis of the bedrock groundwater also indicated occurrences of dioxins and furans in monitoring well MW11. Individual dioxin/furan constituent concentrations ranged from 8.1 picograms per liter (pg/L) to 33.9 pg/L, and totals ranged from 11.3 pg/L to 144 pg/L.

Isoconcentration contour maps for TCE and PCBs were created from these results, and a "hot spot" of contamination is present in the west-southwestern portion of the facility property, located around monitoring wells MW11 and MW12.

2.4 Operable Unit 4

From 1994 through 1999, EPA has collected sediment, surface water and floodplain soil samples along the Bound Brook adjacent to and downstream of the industrial park. Biota (edible fish, crayfish, and small mammals) samples were also collected from Bound Brook, New Market Pond, and Spring Lake in 1997.

Aroclor-1254 concentrations as high as 580 mg/kg were measured in the sediment and floodplain soils. Copper, zinc, lead, and barium were detected in the soils and sediments, at concentrations up to 210 mg/kg, 620 mg/kg, 540 mg/kg, and 380 mg/kg, respectively. Aroclor-1254, Aroclor-1248, 1,2-DCE, and various metals were also detected at elevated concentrations in surface water samples from Bound Brook. Fish fillet samples contained detections of two PCBs and seven pesticides.

An ecological risk assessment for the Bound Brook Corridor indicated that contamination of stream sediments adjacent to, and apparently associated with, the site was present at levels that have been linked to adverse impacts in benthic organisms in other freshwater systems.

TABLE 2-1

VOC AND PCB DETECTIONS IN ON-SITE GROUNDWATER (2000 RI)
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE

SITE	Screening Criteria	MW01A	MW02A	MW03	MW04	MW05	MW06	MW07	MW08	MW09	MW10	MW11	Duplicate of MW11	MW12
Vinyl chloride	2	160	9	--	88 J	--	--	--	--	--	--	--	--	--
cis-1,2-Dichloroethene	10	1800	15	26	2500	44	5300	2600	11000	--	--	160000	190000	21000
Trichloroethene	1	1600	17	37	140	250	7600	17000	34000	1100	--	100000	120000	25000
Tetrachloroethene	1	--	--	--	--	12 J	240 J	--	--	520	--	--	--	--
Aroclor 1232	0.5	0.53	--	--	4.6	--	7.8	1.3	19 D	3.8	--	31 D	37 D	80 D
Aroclor 1254	0.5	--	--	--	--	4.3 J	--	--	--	--	--	9.2	7.8 J	4.1

Notes:

All results are in ug/L.

Screening criteria as of 2000 RI.

3.0 TASK PLAN FOR REMEDIAL INVESTIGATION/FEASIBILITY STUDY OVERSIGHT

This section describes the tasks to be performed for this RI/FS Oversight WA, including:

Task 1	Project Planning and Support
Task 2	Community Relations
Task 3	Data Acquisition Oversight
Task 4	Sample Analysis
Task 5	Analytical Support and Data Validation of Split Samples
Task 6	Data Evaluation of Split Samples
Task 7	Review PRP's Risk Assessment
Task 8	Treatability Study and Pilot Testing Oversight
Task 9	Review PRP's Remedial Investigation Report
Task 10	Remedial Alternatives Screening
Task 11	Review PRP's Remedial Alternatives Evaluation
Task 12	Review PRP's Feasibility Study Report
Task 13	Post RI/FS Support
Task 14	Administrative Record
Task 15	Work Assignment Closeout

3.1 Task 1 - Project Planning and Support

The project planning task includes the efforts for execution and overall management of the Work Assignment. Technical and management activities required to oversee the PRP's implementation of the RI/FS, along with associated costs, have been developed during the planning phase and are presented in this Work Plan. Activities required for general Work Assignment management, including preparation of monthly progress reports and invoices, that will occur throughout the duration of the project are also included in this task.

3.1.1 Project Administration (Subtask 1.01)

Project administration support executed during the performance of this Work Assignment as part of Task 1 includes both RAC II Program Support (Subtask 1.01.01) and project-specific management activities (Subtask 1.01.02).

RAC II Program support for this Work Assignment will include: reviewing task and subtask budgets: reviewing the Work Assignment Technical/Financial Status Reports; providing technical resource management; responding to questions from the EPA Project Officer and/or Contracting Officer; and preparing the monthly progress report/voucher.

Project-specific management will be provided by the TtEC Project Manager, and will include: resource management; preparation of the technical portion of the monthly progress report; coordination of oversight field investigation, data evaluation and report preparation/reviewing efforts; review and updating of the project schedule and weekly financial reports; and weekly (at a minimum) communication with the EPA WAM.

3.1.2 Attend Scoping Meeting (Subtask 1.02)

A scoping meeting was held at the EPA Region 2 offices in New York City on 6 December 2005.

3.1.3 Conduct Site Visit (Subtask 1.03)

A site visit will be conducted by EPA, TtEC, and the PRP's contractor personnel to observe current site conditions.

3.1.4 Develop Draft Work Plan and Associated Cost Estimate (Subtask 1.04)

Under this subtask, TtEC prepared and submitted the Draft RI/FS Oversight Work Plan. The RI/FS Oversight Work Plan includes: background information on the previous remedial work performed at the site and a summary of site contamination, descriptions of the tasks to be performed, the procedures to accomplish them, project documentation, and a summary of major submittals. TtEC has used the in-place quality assurance/quality control (QA/QC) systems and procedures to assure that the work plan and other deliverables are of professional quality.

3.1.5 Negotiate and Revise Draft Work Plan (Subtask 1.05)

TtEC and EPA participated in a Work Plan negotiation meeting via tele-conference to discuss and agree upon the costs required to accomplish the tasks outlined in the SOW. TtEC has submitted this Final RI/FS Oversight Work Plan (Revised Work Plan) incorporating the agreements made in the negotiation meeting. This Final RI/FS Oversight Work Plan includes a summary of the negotiations as an attachment. The Work Plan has been submitted in both hardcopy and electronic formats (e.g., WordPerfect text files and Lotus1/2/3 spreadsheets).

3.1.6 Evaluate Existing Data and Documents (Subtask 1.06)

TtEC will review available information pertaining to the site provided by the WAM, including:

- Record of Decision;
- Previous RI/FS Reports; and
- Administrative Order on Consent (including the attached Statement of Work).

The following documents, provided by the WAM, will be reviewed and commented upon.

- The PRP's Preliminary Conceptual Site Model;
- The PRP's Health and Safety Plan;
- The PRP's RI/FS Work Plan; and

- The PRP's Sampling Analysis Plan. This will include review of the Draft and Final Field Sampling Plan and the Final Quality Assurance Project Plan (QAPP).

The PRP documents will be reviewed by TtEC to determine if the plans comply with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), relevant EPA guidance, and standard professional practices; provide for the collection of all data needed for performing an RI/FS; include a description of the work to be performed; and incorporate previous comments on any of the plans provided by EPA. TtEC's comments on the PRP's plans will be submitted to EPA within 30 days of receipt of the plans.

3.1.7 Quality Assurance Project Plan (Subtask 1.07)

A site-specific RI/FS Oversight QAPP will be prepared in accordance with the Uniform Federal Policy for QAPPs (EPA, 2005), the TtEC RAC II Program Quality Management Plan (TtEC, 2004), and other EPA Region 2 guidance and/or procedural requirements. The draft QAPP will be submitted to EPA within 30 calendar days after the Work Plan is approved. The final QAPP will be submitted to EPA within 15 calendar days after receipt of EPA final comments on the draft QAPP.

The RI/FS Oversight QAPP will describe the project objectives and organization, functional activities, field activities and procedures, and quality assurance/quality control (QA/QC) protocols used to achieve the desired Data Quality Objectives (DQOs), including the following:

- Sampling objectives;
- Sample chain-of-custody/documentation;
- Sample numbers, matrices, locations, collection frequencies and type of analyses;
- Sampling equipment and procedures;
- Sample handling, preservation, and shipment;
- Sample analyses and laboratory requirements; and
- QA/QC protocols and criteria utilized, including data validation.

The chain of communication between the TtEC oversight field personnel, the TtEC Project Manager, the EPA Work Assignment Manager (and other technical personnel at EPA), and PRP personnel will be detailed in the QAPP. TtEC will report to EPA any PRP activities that are not in conformance with the project documents. TtEC will not provide technical direction to the PRP personnel. The QAPP will also provide a detailed description of the comparison evaluation for the split and PRP samples (see Section 3.6.4), including the basis for the Relative Percent Difference (RPD) criteria to be utilized. TtEC will document any required changes to the QAPP by following the Field Change Request process that will be described in the QAPP.

3.1.8 Health and Safety Plan (Subtask 1.08)

A site-specific RI/FS Oversight HASP will be prepared by TtEC to provide health and safety protection for TtEC field personnel engaged in the oversight of the field investigation or other activities conducted within the investigation area in accordance with 29 CFR 1910.120 (1)(1) and (1)(2), 40 CFR 300.150 of the NCP, and other applicable codes and guidelines. Requirements for employee training, protective equipment and medical surveillance, standard operating procedures, and a contingency plan will be included in the HASP. The HASP will be submitted to EPA within 30 calendar days after the Oversight Work Plan is approved. The Final HASP will be submitted 15 days after receipt of EPA final comments on the draft HASP. The TtEC HASP will be updated, as warranted, if new conditions or tasks arise during the performance of field investigation activities. A Field Change Request Form will be used to make any required modifications to the HASP based on site-specific conditions.

3.1.9 Non-RAS Analyses (Subtask 1.09) - Optional

TtEC will implement the EPA-approved laboratory quality assurance program that provides oversight of subcontracted laboratories through periodic performance evaluation sample analyses and/or on-site audits of operations. The program includes a system of corrective ,actions that will be used performance does not meet the standards of the program.

3.1.10 Meetings (Subtask 1.10)

TtEC will attend progress meetings during the course of the Work Assignment. It is assumed that 20 meetings will be held, at the EPA Region 2 offices in New York City. The TtEC Project Manager will prepare and submit meeting minutes, which will reflect the discussions that transpired, to the EPA WAM.

3.1.11 Subcontract Procurement (Subtask 1.11)

Subcontract procurement activities will be performed under this subtask. Three subcontractors will be required.

3.1.12 Perform Subcontract Management (Subtask 1.12)

TtEC will manage and oversee the three subcontractors under this subtask. TtEC will monitor progress, maintain systems, and keep records review and approve invoices and, as necessary, issue contract modifications.

3.2 Task 2 - Community Relations

TtEC will provide community relations support to EPA throughout the RI/FS in accordance with "Community Relations in Superfund - A Handbook," January 1992.

3.2.1 Community Interviews (Subtask 2.01) - Not Applicable

3.2.2 Community Relations Plan (Subtask 2.02) - Not Applicable

3.2.3 Public Meeting Support (Subtask 2.03)

TtEC will make arrangements for two public meetings/availability sessions/open house including the selection and reservation of a meeting space (as per technical direction from the EPA WAM). A list of typical activities the contractor may be asked to perform include but are not limited to:

- Attend public meetings or availability sessions, provide recording and/or stenographic support, prepare draft and final meeting summaries, prepare presentation materials/handouts.

- Prepare draft and final visual aides for the Public Meeting (i.e., transparencies, slides, and handouts as instructed by EPA). Fifteen overhead transparencies and one handout will be prepared for each public meeting. Final visual aids will be developed based on EPA comments on the draft visual aids.

- TtEC will make the arrangements for site tour(s)/meeting(s)/open house(s) including the selection and reservation of a meeting space as directed by the EPA WAM. Five site tours/meetings/open houses will be held.

- TtEC will reserve a court reporter for one of the public meetings as directed by the EPA WAM. A full-page original and a "four on one" page copy, along with an electronic copy of the transcripts will be provided to EPA, with additional copies placed in the information repositories as required. The diskette will be provided in Word Perfect 8.0 or most recent EPA-approved word processing format.

3.2.4 Fact Sheet Preparation (Subtask 2.04) - Not Applicable

3.2.5 Proposed Plan Support (Subtask 2.05)

TtEC will assist in the preparation of the Draft and Final Proposed Plan describing the preferred alternative evaluated in the PRP's Feasibility Study. The Plan will be prepared by the EPA, in accordance with the National Contingency Plan (NCP) and the "EPA Community Relations in Superfund-A Handbook" (EPA, 1992). TtEC will make one copy of the draft Proposed Plan, and three copies of the final Proposed Plan, which will incorporate EPA comments on the draft.

3.2.6 Public Notices (Subtask 2.06)

TtEC will prepare newspaper announcement(s)/public notice(s) in support of the various public meetings/site tour(s)/open houses. Four newspaper advertisements (ads placed in newspapers) will be placed in the most widely read local newspaper(s). Two of the ads will be placed in a large newspaper and two of the ads will be placed in a small, town newspaper.

3.2.7 Information Repositories (Subtask 2.07) - Not Applicable

3.2.8 Site Mailing List (Subtask 2.08) - Not Applicable

3.2.9 Responsiveness Summary Support (Subtask 2.09)

Support for the Responsiveness Summary provided by TtEC will include assistance in addressing comments received during the public comment period on the Proposed Plan and Feasibility Study.

3.3 Task 3 - Data Acquisition Oversight

This task involves oversight of the PRP's field work efforts. The planning for this task is accomplished in Task 1, Project Planning and Support, whereby all of the necessary plans required to conduct the oversight of the PRP's data acquisition work are developed. This task begins with EPA's approval of the RI/FS Oversight QAPP and ends with the demobilization of field personnel and equipment from the site.

TtEC will perform the following field activities in accordance with the EPA-approved Oversight Work Plan, HASP, and QAPP developed in Task 1 (Project Planning and Support).

3.3.1 Mobilization and Demobilization (Subtask 3.01)

Mobilization will be performed over three days and will encompass the following activities: coordinate mobilization efforts with the PRP's contractor; obtain the required oversight supplies; and attend an initial health and safety briefing for all project team members.

Demobilization will be performed over three days and include the coordination of demobilziation efforts with PRP contractor and demobilization following completion of the PRP's field work.

3.3.2 Perform Field Investigation Oversight (Subtask 3.02)

TtEC will oversee the PRP's Contractor during field investigation activities, including, but not limited to, mobilization, drilling of soil borings, installation and development of monitoring wells, collection of soil/groundwater samples, and demobilization. Oversight of sample collection procedures will also be performed, to ensure the proper management of samples by the PRP's contractor. The PRP's sample preservation, chain of custody and protective sample packing techniques will be assessed. Two TtEC field representatives will be on-site, one for approximately 28 weeks and the other for approximately 14 weeks.

One TtEC representative will be on-site for each of the quarterly sampling events (each event will have a duration of two weeks). No split sampling will be performed during the last three quarterly sampling events.

TtEC field personnel will maintain field logbooks and take photographs, as appropriate, to provide field documentation of the PRP activities. The logbooks will be serially numbered, marked "Enforcement Confidential," and will be signed and dated at the end of each day of field activity by the on-site TtEC representative. The logbook will be a bound weatherproof notebook, and entries to the logbook will be filled out legibly in ink. Pertinent information to be recorded in field logbooks includes all information that is necessary to reconstruct the investigation operations, such as weather conditions, visual characterization/description of site conditions, listing of on-site personnel, field program procedures, general sample descriptions, sample management procedures, and descriptions of any issues, problems, inconsistencies or other non-compliance by the PRP's contractor regarding their approved plans.

In addition to overseeing PRP activities, TtEC field personnel will collect split samples at a rate of 10 percent (approximately 45 samples) of the environmental samples collected by the PRP's Contractor. Trip blanks will be collected during sampling for volatile organic analyses in aqueous matrices (i.e., groundwater, surface water). Field blanks will not be split by TtEC with the PRP's Contractor. Procedures to ensure proper management of the split samples (i.e., sample preservation, shipment, packaging, chain of custody, tracking, etc.) will be described in the RI/FS Oversight QAPP. Split sampling will not be performed during the PRP's ongoing quarterly sampling activities.

TtEC field personnel will review whether the PRP's Contractor characterizes and disposes investigation-derived wastes (IDW) in accordance with the EPA-approved Work Plan. At this time, it is not anticipated that TtEC will generate IDW during the field effort, with the exception of personal protective equipment [PPE] (e.g., gloves). This PPE will be disposed of by the PRP's contractor. During field activities, the TtEC Project Manager will communicate with the EPA WAM at least once per week. More frequent communication may be needed, depending on the work being performed at that time.

3.3.3 Prepare Field Investigation Oversight Reports (Subtask 3.03)

TtEC will prepare and submit Bi-Weekly Field Oversight Reports in the form of a one page letter with attachments, to the WAM. The letter will be a bullet list of oversight field activities and procedures completed, and observations made during the two week period. Copies of any photographs taken and the pertinent pages of the field logbook will be attached to the letter. Bi-Weekly Field Oversight Reports will be submitted for the duration of the PRP's field work. Each Field Oversight Report will be submitted seven calendar days after each two week period.

At the end of all PRP field activities, TtEC will prepare and submit a Final Field Oversight Summary Report to the WAM. This report will be a summary of the key observations reported in the bi-weekly letters submitted during the oversight of the investigation. This report will be submitted to the WAM 30 calendar days after the end of all field activities.

3.4 Task 4 - Sample Analysis

Laboratory services will be provided following the National Field and Analytical Services Team Advisory Committee (FASTAC) decision tree for selecting analytical services, that has been adopted by EPA Region 2 (EPA, 2003), for this project. The options for analytical services using this decision tree in order of preference are as follows:

- Tier 1 - EPA laboratories (e.g., the EPA Region 2 Division of Environmental Science and Assessment (DESA) Laboratory in Edison, New Jersey);
- Tier 2 - EPA Contract Laboratory Program (CLP) or other national analytical contracts;

- Tier 3 - Region specific analytical services contracts; and
- Tier 4 - Subcontractor laboratories via field contracts.

Approximately 45 split samples (plus an additional 20 quality control trip blank samples) will be collected during the PRP's field work. It is anticipated that the split samples from the monitoring well sampling will be sent to the EPA Region 2 DESA Laboratory and/or through the EPA CLP program. Vapor samples for analysis of VOCs will be sent via a EPA National Non-RAS contract (Tier 2). TtEC will arrange for the analysis of non-routine analytical samples collected during Task 3.

If required, due to availability restraints or other reasons, analysis of the vapor samples may be performed by a subcontracted laboratory.

3.5 Task 5 - Analytical Support and Data Validation of Split Samples

3.5.1 Collect, Prepare and Ship Samples (Subtask 5.01)

TtEC will prepare and ship all split samples in accordance with the procedures described in the RI/FS Oversight QAPP and the EPA CLP Guidance for Field Samplers (EPA, 2004). TtEC will provide the sample containers for split sampling for the monitoring well portion of the investigation; the canisters for the vapor portion will be supplied by the EPA National Non-RAS Contract or TtEC's Subcontract Laboratory (if directed). EPA's Field Operations and Records Management System (FORMS II Lite) will be used in the field for shipping documentation preparation. Arrangements will be made for sample shipment and delivery schedules with the EPA DESA Laboratory, the CLP Regional Sample Control Center (RSCC) and Contract Laboratory Analytical Support Services (CLASS) offices, and/or appropriate subcontract laboratories (as requested).

3.5.2 Sample Management (Subtask 5.02)

TtEC's sample management will include:

- Coordinating with the CLP RSCC office in Edison, New Jersey and the CLASS office in Chantilly, Virginia and/or DESA personnel in Edison, New Jersey regarding scheduling, tracking, and oversight of the sample analyses, data validation, and quality assurance issues.
- Implementing the EPA-approved laboratory QA program, as described in the RAC II Program Delivery of Analytical Services Plan (July 1998), which provides oversight of subcontracted laboratories. (Note: This activity shall be performed only in the event that Subtasks 1.09 and 4.03 are implemented).
- Providing chain of custody procedures, information management, and data storage/ retention functions, in accordance in accordance with the procedures outlined in the RAC II Program Quality Management Plan, sections of the site-specific QAPP , and the EPA-approved RAC II Program Delivery of Analytical Services Plan (July 1998).TtEC will perform accurate

chain-of-custody procedures for sample tracking, protective sample packing techniques, and proper sample-preservation techniques.

TtEC will make split sampling available to NJDEP if requested by EPA. Approximately 25 percent of the samples TtEC splits with PRP will be made available to NJDEP (about 11 split samples). TtEC will not, however, supply bottleware or provide packing and shipping for these samples.

3.5.3 Data Validation (Subtask 5.03)

All split sample data analyzed by the EPA DESA Laboratory in Edison, New Jersey will be validated by DESA Laboratory personnel. CLP RAS data will be validated by EPA Region 2 Hazardous Waste Support Section personnel in Edison, New Jersey. Results from the vapor samples analyzed through the EPA National Non-RAS contract will be validated by EPA Hazardous Waste Support Section or Environmental Services Assistance Team (ESAT) personnel in Edison, New Jersey.

If directed by EPA to perform subcontracted laboratory analyses (Subtasks 1.09 and 4.03), TtEC will validate these results, utilizing Non-RAS Laboratory SOWs, applicable sections of the EPA National Functional Guidelines for Organic and Inorganic Data Validation, relevant sections of the EPA Region 2 Data Validation Standard Operating Procedures (SOPs), and best professional judgment. The TtEC data validators who would perform this task have been trained and are certified by EPA Region 2. As part of the validation, TtEC will:

- Review the analytical results against validation criteria;.
- Review the data and make a data usability determination; and
- Provide written documentation of the validation efforts by developing a Data Validation Report and submitting the report to the EPA WAM after the results have been validated.

3.6 Task 6 - Data Evaluation of Split Samples

This task involves comparison of the PRP's data that will be used in the remedial design effort with data resulting from the analysis of split samples. Data evaluation will begin with the receipt of analytical data from the data acquisition task and end with the submittal of the Data Evaluation Summary Report. TtEC will compare, evaluate, interpret, and tabulate data in an appropriate presentation format for final data tables, and submit a report of the results of the data evaluation.

3.6.1 Data Usability Evaluation and Field QA/QC (Subtask 6.01)

TtEC will qualitatively evaluate the usability of both the PRP and split sample results. The evaluation will include examining data validation summary reports and verifying that the sampling procedures and analytical results were obtained following the applicable protocols, are of sufficient quality to satisfy DQOs, and can be relied upon for performing the risk assessments, the Feasibility Study, and remedial design efforts. Any uncertainties associated with the data will be assessed. The results of this evaluation will be presented to the EPA in Data Evaluation Summary Reports (see Section 3.6.4).

3.6.2 Data Reduction, Tabulation, and Evaluation (Subtask 6.02)

Validated split sample data (EPA and PRP) assessed to be usable and relevant to the project will be compiled, entered and stored into GIS/Key®, the data management/Geographic Information System (GIS) platform selected by TtEC for this oversight project. For reporting purposes, the data will be summarized in tabular format (i.e., Lotus 1-2-3 spreadsheets), organized by matrix (e.g., groundwater, vapor); analytical fraction (e.g., VOCs, metals); specific depth intervals sampled (e.g., shallow bedrock groundwater, deeper bedrock groundwater); and/or segregated according to on-site/off-site, specific contaminant source area and/or other unique areas, if warranted. The analytical tables will identify individual samples by unique sample location/well identification numbers and will include the sample collection dates, detection limits for parameters not detected, and laboratory and/or data validation qualifiers. Verification will be performed at each step in the process to reduce the probability of transcription/typographical errors. For example, computerized entry of data will be verified by reviewing the laboratory package Form I results sheets against the tables prepared by the GIS/Key® program.

The analytical results for those constituents that had at least one detection in either the EPA split sample data set or the PRP data set (for those locations which correspond to split sample locations) will be compiled into tables, independent of those described in the preceding paragraph. These tables will contain the two data sets in separate columns, so that a comparison evaluation can be performed.

Standard units for results reporting (e.g., ug/L for groundwater) will be used in all tables, texts, and figures used to summarize the analytical results.

An evaluation of hydrogeological data and vapor investigation data provided by the PRP, likely within their Site Characterization Summary Report, will be performed by TtEC. Data may include boring logs/monitoring well diagrams, potentiometric maps, isoconcentration figures, and vapor sampling information sheets. The technical accuracy and professional quality of the data, along with compliance with PRP plans, will be assessed during the evaluation.

3.6.3 Modeling (Subtask 6.03)

Computer modeling performed by the PRP will be reviewed by TtEC. The technical accuracy and professional quality of the model (including input information, figures, etc.) will be assessed during the evaluation. TtEC will not perform computer modeling for this WA.

3.6.4 Develop Data Evaluation Summary Report (Subtask 6.04)

A Data Evaluation Summary Report will be prepared subsequent to the monitoring well installation/first round of groundwater sampling and vapor intrusion sampling investigations. Reports will not be prepared for the on-going quarterly field sampling.

The Data Evaluation Summary Report will include the following:

- A summary of the field oversight events (including any discrepancies noted between the PRP's Work Plan and the work performed);

- The results of the evaluation of the hydrogeological/vapor data associated with the event;
- A summary of the split sample analytical results collected during the sampling event;
- A comparison of the split sample data with the PRP data using the Relative Percent Difference (RPD) between the data sets (additional information on the RPD calculations will be included in the site-specific QAPP);
- A discussion of discrepancies between the data sets (if any);
- The results of the usability analysis of the data; and
- A tabulation of the split sample data.

The Data Evaluation Summary Report will be submitted in both hardcopy and electronic format (i.e., WordPerfect with Lotus 1-2-3 data result tables) to the EPA for review and approval within 21 calendar days after Subtask 6.02.

After submission of the report, a meeting will be held between EPA and TtEC at the EPA Region 2 offices in New York City to discuss the evaluation results from the field investigation.

3.7 Task 7 – Review PRP's Risk Assessment

3.7.1 Human Health Risk Assessment (Subtask 7.01)

TtEC will review and provide technical comments to EPA in the form of letter reports, on the following PRP's submittals:

- Memorandum on Exposure Scenarios and Assumptions (MESA). TtEC's comments will be submitted to EPA within 30 calendar days of receipt of the MESA;
- Pathways Analysis Report (PAR) (including the Conceptual Site Model (CSM). TtEC's comments will be submitted to EPA within 30 calendar days of receipt of thePAR and CSM;
- Draft HHRA Report. TtEC's comments will be submitted to EPA within 45 calendar days of receipt of the Draft HHRA; and
- Final HHRA Report. TtEC's comments will be submitted to EPA within 14 calendar days of receipt of the Final HHRA.

These documents will be reviewed following EPA's Risk Assessor's review. EPA's comments on these documents will be provided to TtEC and used to guide TtEC's review.

The purpose of the PRP's HHRA will be to determine if site contaminants at OU-3 pose a current or potential future risk to human health in the absence of any remedial action. The results of the risk assessment will be reviewed relative to this objective and taking into account EPA's comments on the assessment. In addition, the review will be conducted to determine if the HHRA provides a justification for remedial action at OU-3 and, if so, whether the HHRA identifies the specific exposure pathways that need to be remediated to manage human health risk.

The HHRA will be reviewed to determine if it was conducted in accordance with site-specific guidance specified by EPA to the PRP and the applicable EPA guidance, procedures, assumptions, methods, and reporting formats for human health risk assessment.

As part of the overall review, the following aspects of the PRP's risk assessment will be reviewed and commented on:

- Hazard Identification (sources): TtEC will review the information provided in the PAR on the hazardous substances present at the sites and confirm that the major contaminants of concern have been identified at the sites.

- Dose-Response Assessment: TtEC will review that contaminants of concern in the PAR have been selected based on their intrinsic toxicological properties and that the most recent toxicological databases have been referenced.

- Conceptual Model for the Site: As part of the conceptual exposure/pathway analyses the conceptual model for OU-3 will be reviewed.

- Prepare Conceptual Exposure/Pathway Analysis: The selection of exposure pathways (e.g., drinking water) in the MESA/PAR will be reviewed and analyzed. The proximity of contaminants to exposure pathways, and their potential to migrate into critical exposure pathways, will be reviewed.

- Characterization of the Sites and Potential Receptors: Human populations in the exposure pathways in the MESA/PAR will be reviewed to determine if the sites were adequately characterized.

- Exposure Assessment: The exposure assessment in the MESA/PAR will be reviewed for an evaluation of the likelihood of such exposures occurring and as well as providing a basis for the development of acceptable exposure levels. In developing the exposure assessment, the PRP's will develop reasonable maximum estimates of exposure point concentrations (EPCs) for both current land use conditions and potential future land use conditions at the OU-3 site. The statistical approach will be reviewed for concurrence with EPA protocols. The values used for EPCs and daily intake calculations will be reviewed for appropriateness and accuracy. The text will be reviewed for consistency.

- Modeling: Modeling performed to evaluate the data relating to contaminant fate and transport in groundwater or in the vapor phase, migration or emissions from groundwater, vapor intrusion, or soil gas will be reviewed.

- Risk Characterization: During risk characterization, chemical-specific toxicity information, combined with quantitative and qualitative information from the exposure assessment, will be compared to measured levels of contaminant exposure levels and the levels predicted through environmental fate and transport modeling. These comparisons will determine whether concentrations of contaminants at or near the sites are affecting or could potentially affect human health. The quantification of the site risks, both noncarcinogenic and carcinogenic, in the Draft HHRA Report will be reviewed for accuracy. The review will consist of checking calculations and determining whether the risk summary is accurate. In the event that there are risk exceedances, remedial goal options will be reviewed.

- Identification of Limitations/Uncertainties: Critical assumptions (e.g., background concentrations and conditions), limitations, and uncertainties in the Draft HHRA Report will be reviewed.

It is assumed that comments submitted for the PAR will be incorporated into the Draft HHRA Report. The review for the Draft HHRA Report will include a check that all comments on the PAR were incorporated. In addition, the PRP's Final HHRA Report will be reviewed for completeness (i.e., that all comments on the Draft HHRA Report were incorporated).

3.7.2 Ecological Risk Assessment (Subtask 7.02) - Not Applicable

3.8 Task 8 - Treatability Study and Pilot Testing Oversight - Not Applicable

3.9 Task 9 - Review PRP's Remedial Investigation Report

TtEC will perform a technical review of the PRP's Draft and Final RI Reports, and will generate comments in the form of a Technical Memorandum Letter. As part of the review, TtEC will identify data gaps that may be important for the Human Health Risk Assessment and Feasibility Study for the Site.

3.9.1 Review PRP's Draft RI Report (Subtask 9.01)

TtEC will review the PRP's Draft RI Report to assess the professional quality, technological accuracy, and compliance with the PRP's plans. The review will also include evaluating the RI Report for compliance with EPA RI/FS Guidance, the Site Characterization Summary Report (as previously reviewed in Subtask 6.02), the Administrative Order on Consent, CERCLA, and all ARARs. TtEC will provide comments to the EPA in a Technical Memorandum Letter. TtEC's comments on the draft will be submitted to EPA 30 days after receipt of the draft.

3.9.2 Review PRP's Final RI Report (Subtask 9.02)

TtEC will review and provide comments on the PRP's Final RI Report. This review will confirm that the report addresses comments previously provided on the draft version. A Technical Memorandum Letter detailing any additional concerns will be submitted to the EPA by TtEC. TtEC's comments on the Final RI Report will be submitted to EPA 21 days after receipt fo the Final RI Report.

3.10 Task 10 - Remedial Alternatives Screening

The PRP will investigate those hazardous waste management alternatives that will remediate or control contaminated media (ground water and vapor intrusion) remaining at the site, as deemed necessary in the RI, to provide adequate protection of human health and the environment. The potential alternatives will encompass, as appropriate, a range of alternatives in which treatment is used to reduce the toxicity, mobility, or volume of wastes but vary in the degree to which long-term management of residuals or untreated waste is required, one or more alternatives involving containment with little or no treatment; and a no-action alternative. The PRP will submit a Draft Technical Memorandum describing the development and screening of remedial alternatives for the site.

3.10.1 <u>Review PRP's Draft Technical Memorandum (Subtask 10.01)</u>

TtEC will review the PRP's Draft Technical Memorandum, and will provide comments to EPA in the form of a letter report. The review will assess the memorandum's professional quality, technical accuracy, and compliance with the PRP's RI/FS Work Plan. The review will also seek to ensure compliance with EPA's RI/FS Guidance. Specific requirements of this review are described below. TtEC will submit comments on the Draft Technical Memorandum 21 days after receipt fo the PRP's document.

3.10.1.1 Establish Remedial Action Objectives

TtEC will review the PRP's site-specific remedial action objectives which should be developed to protect human health and the environment. The objectives should specify the contaminant(s) and media of concern, the exposure route(s) and receptor(s), and an acceptable contaminant level or range of levels for each exposure route (i.e., preliminary remediation goals).

3.10.1.2 Establish General Response Actions

TtEC will review the PRP's proposed general response actions (GRAs) for each medium of interest. The GRAs should define contaminant, treatment, excavation, pumping, or other actions, singly or in combination that will satisfy the remedial action objectives. The response actions should take into account requirements as identified in the remedial action objectives and the chemical and physical characteristics of the Site.

3.10.1.3 Identify and Screen Applicable Remedial Technologies

TtEC will review the PRP's proposed technologies based on the developed general response actions. Hazardous waste treatment technologies should be identified and screened to ensure that only those technologies applicable to the contaminants present, their physical matrix, and other site characteristics will be considered. This screening should be based upon the technology's ability to effectively address the contaminants at the site, its implementability and cost.

TtEC will review the PRP's selected representative process options. TtEC will also evaluate if the PRP has adequately addressed the need for treatability testing for those technologies that are probable candidates for consideration during the detailed analysis.

3.10.1.4 Review PRP's Remedial Alternatives in Accordance with NCP

TtEC will review the PRP's Remedial Alternatives in accordance with the NCP, 40 CFR part 300 and the Guidance for Conducting RI/FS Under CERCLA (OSWER Directive 9355.3-01).

3.10.1.5 Review PRP's Remedial Alternatives for Effectiveness, Implementability and Cost

TtEC will review the PRP's remedial alternatives. The developed alternatives should be defined with respect to size and configuration of the representative process options, time for remediation, rates of flow or treatment, spatial requirements, distances for disposal, required permits, imposed limitations, and other factors necessary to evaluate the alternatives. If many distinct, viable options are available and developed, the PRP should screen the alternatives on a general basis with respect to their effectiveness, implementability, and cost to reduce the number of alternatives retained for detailed analysis.

3.10.2 Review PRP's Final Technical Memorandum (Subtask 10.02)

TtEC will review and provide comments on the PRP's Final Technical Memorandum. This review will ensure that the memorandum addresses comments previously provided on the draft version. A letter report detailing any additional comments will be submitted to the EPA within 14 calendar days after receipt fo the Final Technical Memorandum.

3.11 Task 11 - Review PRP's Remedial Alternatives Evaluation

TtEC will review the PRP's Remedial Alternatives Evaluation and provide comments to EPA in the form of a Letter Report. The review will assess whether the PRPs have followed the evaluation procedures as outlined in the National Contingency Plan (NCP), 40 CFR Part 300 and the Guidance for Conducting RI/FS under CERCLA (OSWER Directive 9355.3-01). The Remedial Alternatives Evaluation should include: 1) a technical description of each alternative that outlines the waste management strategy involved and identifies the key ARARs associated with each alternative; and 2) a discussion that profiles the performance of that alternative with respect to each of the evaluation criteria. TtEC's comments on the Remedial Alternatives Evaluation will be submitted to EPA 30 days after receipt fo the PRP's document.

3.12 Task 12 - Review PRP's Feasibility Study Report

The PRP's FS report should consist of a detailed analysis of alternatives and cost-effectiveness analysis in accordance with NCP 300.68(h)(3)(I)(2). The report should contain:

- A summary of alternative remedial actions in accordance with Chapter 3, NCP 300.68(h)(3)(I)(2)(A);

- Cost Analysis in accordance with Chapter 7, NCP 300.68(h)(3)(I)(2)(B);
- Institutional analysis in accordance with Chapter 4, NCP 300.68(h)(3)(I)(2)(C);
- Public-health analysis in accordance with Chapter 5, NCP 300.68(h)(3)(I)(2)(D); and
- Environmental analysis in accordance with Chapter 6, NCP 300.68(h)(3)(I)(2)(E).

3.12.1 Review PRP's Draft FS Report (Subtask 12.01)

TtEC will review the PRP's draft FS Report and provide comments to the EPA in the form of a letter report within 30 days after receipt. The review of the FS Report will evaluate whether the FS adequately addresses the following:

- Summary of Feasibility Study Objectives;
- Summary of Remedial Action Objectives;
- Articulation of General Response Actions;
- Identification and screening of Remedial Technologies;
- Description and screening (if necessary) of Remedial Alternatives;
- Detailed Analysis of Remedial Alternatives - The technical feasibility considerations in the FS should include the careful study of any problems that may prevent a remedial alternative from mitigating site problems. Specific items that should to be addressed are reliability (operation over time), safety, operation and maintenance, ease with which the alternative can be implemented, and time needed for implementation; and
- Summary and Conclusions.

3.12.2 Review PRP's Final FS Report (Subtask 12.02)

TtEC will review and provide comments on the PRP's Final FS Report. This review will confirm that the final report addresses comments provided on the draft version. A letter report detailing any additional comments will be submitted to the EPA within 30 days after receipt of the PRP's Final FS.

3.13 Task 13 - Post RI/FS Support

TtEC will provide support during EPA's preparation and finalization of the ROD based on the PRP's RI/FS (Subtask 13.01) by attending technical meetings, public meetings, briefings, and/or public hearings.

3.14 Task 14 - Administrative Record - Not Applicable

3.15 Task 15 - Work Assignment Closeout

Upon notification from EPA that all technical work performed under this Work Assignment is complete, project closeout activities will be performed.

3.15.1 Package and Return Documents to Government (Subtask 15.01)

This subtask will involve retrieving files from storage after microfilming and packaging them for final transmittal to EPA.

3.15.2 File Duplication, Distribution, and Storage (Subtask 15.02)

TtEC will duplicate, distribute and store files as part of contract closeout. Work Assignment files in TtEC's possession will be organized in accordance with the current approved EPA file index structure (e.g., Administrative Record Index, EPA Superfund File Index, and/or RAC Guidelines for Closeout of Work Assignment).

Prior to duplication and storage for Work Assignment closeout, a file QA audit will be performed to ensure all file elements are present, in order, and that any duplicate or draft technical report copies are removed from the project file.

3.15.3 File Archiving to Meet Federal Records Center Requirements (Subtask 15.03)

TtEC will archive files in accordance with Federal Records Center requirements.

3.15.4 Data Storage (Subtask 15.04)

Microfilm will be used for the long-term storage technology. TtEC will procure (Subtask 1.11) and manage (Subtask 1.12) a subcontractor and distribute the project files in accordance with RAC II requirements (i.e., silver halide original set, diazo duplicate set and hard copies to EPA Region 2 and silver halide original set to TtEC).

3.15.5 Work Assignment Closeout Report (Subtask 15.05)

A Work Assignment Closeout Report (WACR) will be prepared, and will include final costs and LOE hours for all activities conducted by TtEC under the Work Assignment. Costs and LOE hours (by P-level) will be categorized in the same detail and format as the elements contained in the Work Plan and the SOW. The WACRs will be provided in the POI system (if available), and will be provided as an electronic copy (i.e., WordPerfect 8 and/or Lotus 1-2-3, Release 9.0).

4.0 PROJECT MANAGEMENT APPROACH

4.1 Project Organization

TtEC's organizational structure, Figure 4-1, identifies the roles and responsibilities of the various parties involved with the project includes EPA, TtEC, and the PRP and their contractor.

4.2 Key Personnel

For TtEC, the overall project will be performed under the direction of the RAC II Program Manager, William R. Colvin, PMP, P.G.

The Project Manager is Lee Haymon. The Project Manager has the primary responsibility for development of the RI/FS Oversight Work Plan and associated plans; acquisition of scientific, engineering, or additional specialized technical support; and other aspects of the day-to-day activities associated with the project. The Project Manager identifies staff requirements, directs and monitors progress, ensures implementation of quality procedures and adherence to applicable codes and regulations, and is responsible for performance within the established budget and schedule.

Assisting the Project Manager are the project task leads and key technical personnel from various technical disciplines. They are Lynn Niles Arabia for RI Lead; Robert Chozick for FS Lead, Donald Campbell for geology/hydrogeology; Ron Marnicio for human health risk assessment; Sydne Marshall for community relations; Grey Coppi for health and safety; Mark Sielski, P.G. for quality control; and Jon Gabry, Ph.D. for quality assurance. Technical discipline leads will oversee activities related to their expertise and provide their input, as needed, to the Project Manager.

4.3 Project Schedule

TtEC's project schedule is directly dependent upon the PRP's schedule. TtEC has estimated the total duration of the oversight (from PRP Work Plan submittal to Proposed Plan Submittal) is 24 months. One TtEC representative will provide field oversight (40 hour weeks) during the RI, for 28 weeks of oversight. During 14 of the 28 weeks, two TtEC representatives will be on-site. TtEC will provide oversight for ongoing quarterly sampling, which consists of three two week events. In addition to field oversight, TtEC will provide technical review of the PRP's documents as they are provided to TtEC by EPA.

Table 4-1 presents the Summary of Major Submittals for the RI/FS Oversight Work Assignment, which shows TtEC's major project deliverable submittals due to the EPA.

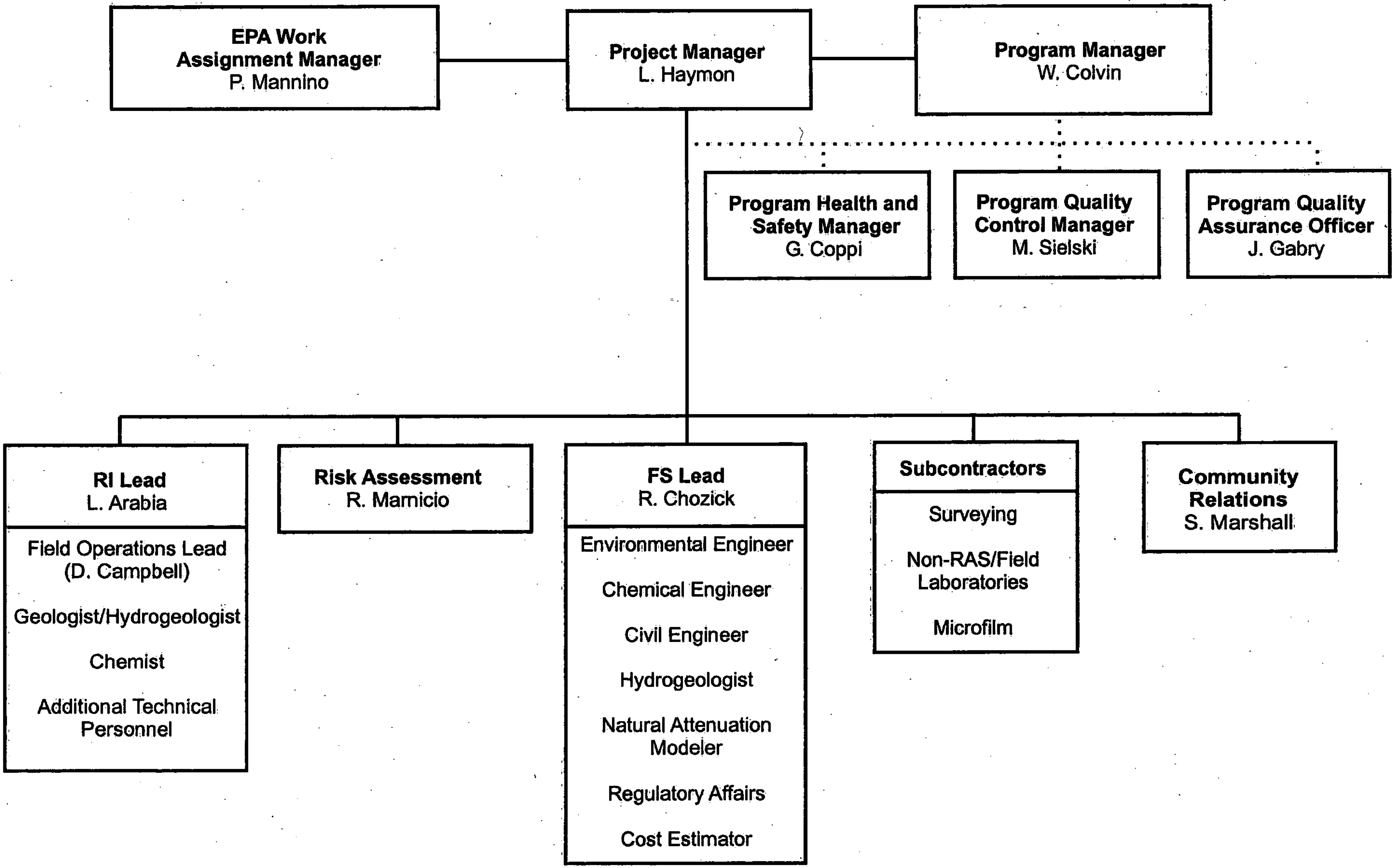
4.4 Budget Estimate

The budget estimate for this Work Assignment has been submitted under separate cover.

Table 4-1
Summary of Major Submittals for the Remedial Investigation/Feasibility Study Oversight at Cornell-Dubilier Electronics Site

TASK	DELIVERABLE	NO. OF COPIES	DUE DATE (calendar days)
1.04	RI/FS Oversight Work Plan	3	30 days after scoping meeting
1.05	Revised RI/FS Work Plan	3	15 days after receipt of EPA final comments
1.07	Draft Quality Assurance Project Plan	3	30 days after WP Approval
1.07	Final Quality Assurance Project Plan	3	15 days after receipt of EPA final comments
1.08	Draft Health & Safety Plan	3	30 days after WP Approval
1.08	Final Health & Safety Plan	3	15 days after receipt of EPA final comments
1.06	Comments on PRP's Conceptual Site Model	3	30 days after receipt of PRP's Plan
1.06	Comments on PRP's Health and Safety Plan	3	30 days after receipt of PRP's Plan
1.06	Comments on PRP's RI/FS Work Plan	3	30 days after the receipt of PRP's Plan
1.06	Comments on PRP's Sampling and Analysis Plan	3	30 days after receipt of PRP's Plan
3.02	Field Investigation Periodic Reports	2	7 days after each 2 week period
3.03	Field Investigation Final Summary Report	2	30 days after the end of all field activities
6.04	Data Evaluation Report	3	21 days after completion of task 6.2
7.01	Comments on PRPs Draft Human Health Risk Assessment Report	3	30 days after receipt of PRP's Report
7.01	Comments on Final Human Health Risk Assessment Report	3	30 days after receipt of EPA comments
7.02	Draft Ecological Risk Assessment Report		Not Applicable
7.02	Final Ecological Risk Assessment Report		Not Applicable
9.01	Comments on PRP's Draft RI Report	3	30 days after receipt of PRP's Draft RI Report
9.02	Comments on PRP's Final RI Report	3	21 days after receipt of PRP's Final RI Report
10.01	Comments on PRP's Draft Remedial Alternatives Technical Memorandum	3	21 days after receipt of PRP's Draft Technical Memorandum
10.07	Comments on PRP's Final Remedial Alternatives Technical Memorandum	3	14 days after receipt of PRP's Final Technical Memorandum
11.00	Comments on PRP's Remedial Alternatives Evaluation	3	30 days after receipt of PRP's Remedial Alternatives Evaluation
12.01	Comments on PRP's Draft Feasibility Study Report	3	30 days after receipt of PRP's Draft FS Report
12.02	Comments on PRP's Final Feasibility Study Report	3	30 days after receipt of PRP's Final FS Report
15.05	Work Assignment Completion Report	3	as directed in the Work Assignment Closeout Notification

Figure 4-1
Project Organization Structure



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